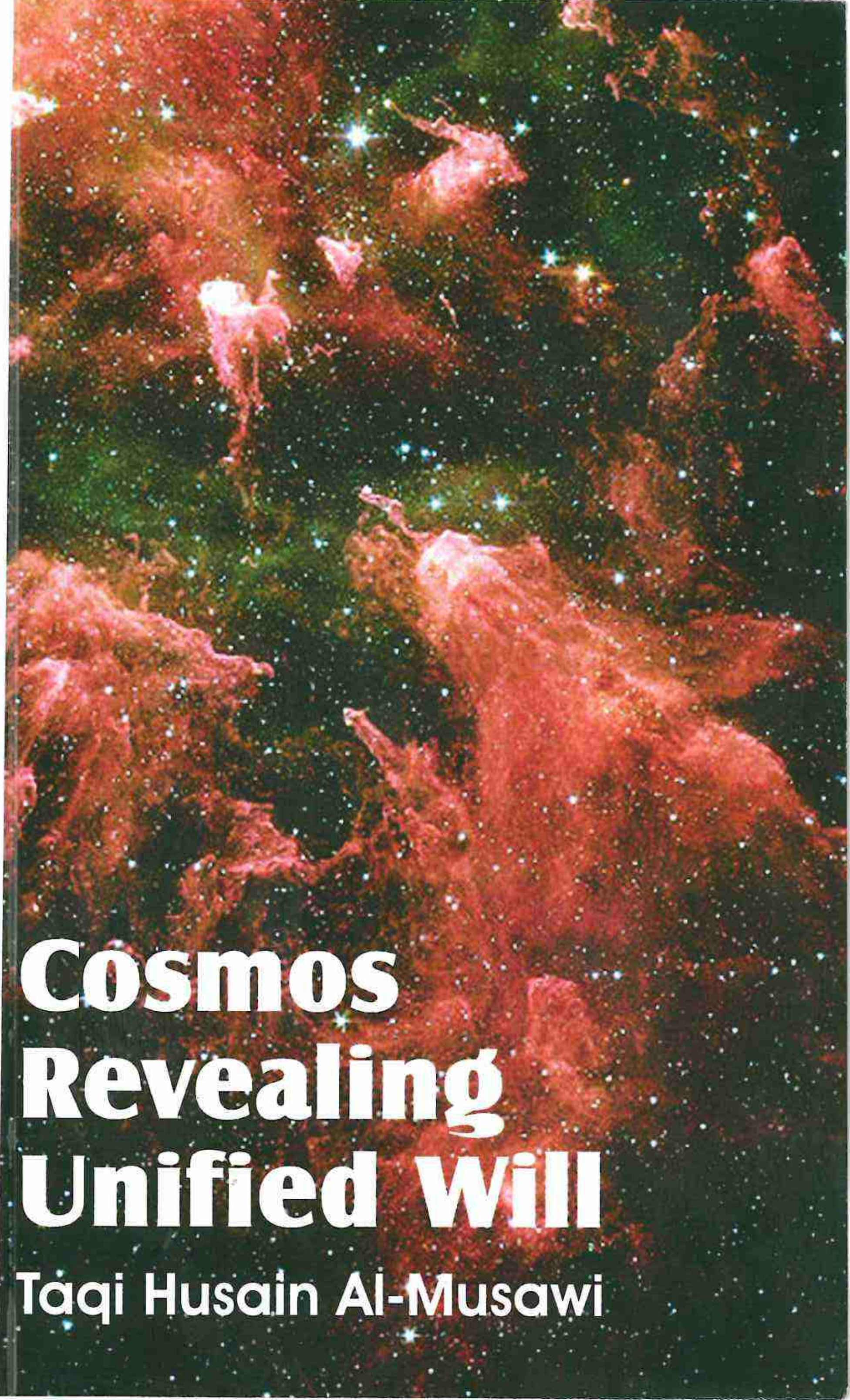

Cosmos
Revealing
Unified Will
Taqi Husain Al-Musawi

COSMOS REVEALING UNIFIED WILL

Taqi Husain Al-Musawi

Wordizen Books

First published in India 2012 by **Wordizen Books**
An imprint of **Leadstart Publishing Pvt Ltd**
Level 1, Trade Centre
Bandra Kurla Complex
Bandra (East), Mumbai 400 051, India.
Telephone: +91-22-40700804
Fax: +91-22-40700800
Email: info@leadstartcorp.com
www.leadstartcorp.com

Sales Office:
Unit: 122 / Building B/2
First Floor, Near Wadala RTO
Wadala (East), Mumbai 400 037, India.
Phone: +91-22-24046887

US Office:
Axis Corp, 7845 E Oakbrook Circle
Madison, WI 53717 USA

ISBN 978-93-81836-26-2
Books Editor: Oswald Pereira
Design Editor: Mishta Roy

Typeset in Book Antiqua
Printed at Repro India Ltd, Mumbai

Price – India: Rs 395; Elsewhere: US $20

About the Author

Taqi Husain Al-Musawi is an Omani national, born in Zanzibar in 1936. He came to his homeland at the beginning of the Second World War as a child. Bred and brought up in Muscat, he studied there in traditional schools, since at that time official schools did not exist in Muscat. He also studied for three years with his father Sayyid Husain (called *Al-Aalim* - meaning Learned) the Arabic language and literature, logic, philosophy and the Islamic Code (Al-Shariah).

In 1953, he migrated to Kuwait, worked there, and also studied by correspondence with University of London and got GCE certificates in several subjects such as pure and applied mathematics, physics, chemistry, Islamic history and many more. Afterwards, he studied B.Sc. in mathematics in the University of London. He also studied Psychology and Astronomy with Faiq Al-Jowhari Institute of Cairo by correspondence.

In 1967, he migrated to Iran, worked and studied there Persian literature and the art of translation at the college of literature of the University of Tehran at Baharistan. He also studied German language at Goethe Institute in Tehran and was delegated by his company Hoechst to Germany for further practical training.

In Tehran, he studied Islamic self-cognition for 12 years and underwent practical experience in it under his Guru Sheikh Sadiq Al-Anqa – Supreme Master of OWEISI Line of Divine Conduct related to Oweis Al-Qarani, famous for Prophet Mohammed's praise and exaltation for him on several occasions without ever seeing him.

In 1987 he came back to Oman and worked as a general manager of a large industrial company. He lectured about Islamic self-cognition for many years.

An avid reader and a self-made man, he is driven by a keen interest in acquiring knowledge. He is familiar with several languages, of which he is proficient in Arabic, English, Persian, and Sindi.

He has written many books, mostly in Arabic, but also in Persian and English - most of them appear on his website: www.taqimusawi.com. His last two books - the Arabic and English versions of 'Cosmos Revealing Unified Will' do not yet appear on his website.



Notice Board

Khaleej Times: Thursday, November 5, 1998 VII

POETIC FULFILMENT

BY BHAMA DEVI

TO MOST of us, the post-retirement phase is one fraught with a certain amount of uncertainty — a period when time suddenly sits heavily on your hands. Which is why, Taqi Husain Al Moosawi's maiden venture into writing poetry is heartwarming.

After the race is run, what better way to achieve total satisfaction, than to turn to one's inner self? Which is what Taqi Husain has done. After having held the post of General Manager of Oman Cable Industry, one of Oman's premier manufacturing industries, for 10 years, Taqi Husain gave up his post in order to turn his mind to things more spiritual.

When he picked up the pen, the Muse was his willing handmaiden, and the words flowed. Within two months his compilation of — hold your breath — 2,018 poems was complete. "I am not a poet, but if people benefit from my ideas and thoughts, then it is a task well laboured," says the soft spoken 60-year-old man. Nor is he a philosopher, although he has chosen thought-provoking subjects to wax lyrical upon. One can even call them lofty.

"I have called it *Seven Heavens* because there is a great world available to man in his own inner self, in his consciousness. It is imperative to start with knowing oneself," says Taqi.

The book is compiled in the form of easy reading gnostic poems, offering anew to the Arabic world a form of literature that has been absent for nearly a 1,000 years since the time of the great gnostic Ibn Al Arabi and his disciple Ibn Al Farir.

Seven Heavens, published by Al Saqi Publishing Company, Beirut, will be available at the Sharjah Book Fair. The author too will be present, and will gladly speak to interested parties on his compilation. The book has already attracted wide attention — at the Damascus International Exhibition held in September this year, over 200 copies were sold. After the Sharjah book fair, Taqi will be travelling to Kuwait and Doha to promote his book.

Seven Heavens will soon be available in Oman, says the author.

Taqi Husain Al Moosawi has found creative fulfilment writing poems

Index

GIFT TO
NASA SCIENTISTS

MERRY CHRISTMAS AND HAPPY NEW YEAR!

I, hereby, admire and laud with my loud voice your latest explorations in space; particularly, those discoveries that relate to DARK ENERGY preceded by DARK MATTER which both together constitute 96 percent of the universe.

Your miraculous breakthrough in the secrets of cosmology has rendered me a topic that is quite interesting around which I have written this book.

I present it as a special gift to NASA scientists who have made this breakthrough discovery in cosmology. You have unwittingly penetrated the screens of secrets which were already propagated by the prophets and the men of God with utmost zeal and enthusiasm.

The analogy of DARK ENERGY to the SOUL and DARK MATTER to LAYERS OF SOUL is explained in this book in meticulous detail which will certainly be of interest to you - the original discoverers of these cosmic great truths.

I hail the modern science and especially the NASA Administration for these breakthrough miraculous discoveries.

Today, ultimately modern science and the religions have met and come together to ignite the torch of a new era of human civilization in which scientific research will focus

on the realms of unknowns like DARK MATTER and DARK ENERGY, a topic so vast and so new that will be of high interest to the religions, who pursue the spiritual matters of SOUL and LAYERS OF SOUL in human beings, and which I have proved in this book are same: DARK ENERGY and DARK MATTER - same truths but in different names.

Since DARK ENERGY and DARK MATTER are ubiquitous they must have their manifestations in the humans also and at the same proportions like in the universe. Now they are proved by me that they are there but they are called differently as SOUL and LAYERS OF SOUL.

Religious introspection reveals these forces at action in the human beings although they are unknown and can't be seen. It is proved now beyond doubt that the absolute truths lay in these unknown realms, which can't be seen neither felt by our humanly tools and instruments.

In religion, self-cognition can reveal them, whereas in science it will be a hot topic for future scientific researches, scrutiny and investigations.

I wish all the best for this blessed union in which Science and Religion both together will join hands to build a new civilization in which absolute truths will be pursued. We will bid farewell to relative truths and focus this time on absolute truths.

The author
TAQI HUSAIN AL-MUSAWI
25/12/2010
Website: taqimusawi.com

Thanks, gratitude and acknowledgement

At the beginning of this book, I want to laud and hail many eminent personalities to whom I have referred in this book; particularly, scientists from NASA, Europe, Japan, India, and other countries, and also the space.com - and in one case European Southern Observatory Press Releases and in two cases spaceflightnow.com - and the well versed writers of space.com, especially the following: Robert Roy Britt, Matt Crenson, Wil Milan, Maia Weinstock, Jack Lucentini, Patricia Reaney, Jeff Foust (in spaceflightnow.com), Andrew Chaikin, Ray Villard, Maggie Fox, Michael Schirber, Jeanna Bryner, Ker Than, Deborah Zabarenko, Kenneth Silber, and Greg Clark.

I also owe a lot of gratitude to Zabihullah Mansoori who has translated the French texts to Persian language of a book he called "The Genius Mind of Shiism". The book is about Imam Sadiq and his genius ideas, written by 25 Academicians, of which 22 are western professors.

I also thank some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously. I also laud with great admiration the writings of my spiritual master Sadiq Anqa; particularly, his valuable book: "Hidden Angles of Life", from which I have benefited in this book.

I also thank the local magazine *Al-Watan* for publishing interviews conducted by Wahid Taja in Damascus and the facts about Miracle of Digits in Koran.



Preface

It is a great honor to address the English speaking readers. Previously, I had written and published several books in Arabic language, and in one case, in Persian, too.

My books were focused on the pure essence in human disposition, whereby Humans thirst for their Creator, and earnestly search for a way to reach Him and enjoy His Nearness. I encouraged such people not to block up their conscience and their pure essence and intuition, and showed them as much as I could how to reach their Creator.

In this book, I am addressing the English-speaking world, including all religions, e.g., Christians, Hindus, Buddhists, etc., as well as the western scientists, particularly scientists from NASA, who offer us daily their wonderful discoveries in space and cosmos, in order to attract their kind attention to the facts and truths about One Will ruling upon cosmos, as well as to the facts and truths about their immortality in their new life after the apparent death.

We do appreciate them highly for their amazing works, and wish them all the best. They are really taking pains in their scientific research and the subsequent discoveries, which have now become a legacy for all the humanity. This great heritage is embedded now in the cultures of the entire Human race, since science and knowledge is not the monopoly of one nation, but belongs to the Human Legacy at large.

The cognition of Oneness and Immortality does not fall within the range of the earthly mind, but rather within the scope of a wider mind, which embraces also the prominent UNKNOWN sections and features of the cosmos - now called Dark Matter or Energy by the scientists.

Scientists need such wider mind, since they have now discovered themselves that 96 percent of the cosmos is unknown - or dark as they call it. That means that the major part of the universe cannot be accessed by science, whatever money or genius minds are invested for this purpose.

Such wider mind was possessed by the prophets, whose legacy is still continuing in the lives and minds of the majority of people all over the world, particularly in the vision of the men of God at any place and time. The wider mind relating to spiritual kingdom has a power of understanding far exceeding that of the mundane mind.

In my opinion, the majority of the world's population is fed up with the mundane life, devoid of spiritual riches, and they are longing for a renewed mental pattern, and yearning to a type of life rich in Faith of Monotheism and Resurrection.

I believe that we are advancing forward in long strides towards an era of leaps and jumps in knowledge and understanding, whereby the world is on the verge of making breakthroughs.

"There may be nothing more mind-boggling than the universe. Imagine we are halfway through 2001, in the heart of the Information Age, nearly 400 years after the telescope was invented and we don't yet know how big the big house is nor what, if anything, lies beyond," says Robert Roy Britt.

"As much as we have progressed in science, we are still finite creatures with limited conceptual abilities and imperfect observational tools," said James Sweitzer, director of astrophysics education at the American Museum of Natural History's Rose Center for Earth and Space.[1]

My whole existence smells the peerless perfume emanating from our living planet, which is now well-prepared to welcome the spiritual kingdom of Monotheism and Resurrection.

The latest developments in NASA discoveries in space and astronomy, in the last 20 years, have completely converted the attitude of the western scientists from pride, vanity and vainglory to modesty and humbleness, and from arrogance to amazement.

Now they are confessing total powerlessness before the unbelievable wonders of the cosmos. **Or putting it in the words of Robert Roy Britt as per Annex 59B: "It is now a few moments later in the same year - 2001 - heart of the same information age, well after the telescope was invented, and we still don't know how big the big house is nor what, if anything, lies beyond. But now, perhaps, we understand what we don't know a little better".[2]**

Until the latest leaps and jumps in NASA's peerless discoveries, unprecedented in the human history, the scientists were boasting of their scientific progress; and in their steps followed the flocks of our dazzled and gasping intelligentsia.

Or putting it in the words of the astronomer Richard Ellis of Caltech (See Annex 21B): "I am as big a fan of dark matter and dark energy as anybody else. But I find

---

[1] Please see the chapter "Is Human a little finite creature?" at the end of this book.
[2] Please see the chapter "How old is cosmos and is it finite?" at the end of this book.

it very worrying that you have a universe where there are three constituents, of which only one, i.e. ordinary matter, is really physically understood. When you teach undergraduates, and they say, "What is dark matter?" Well, nobody is really sure. What is dark energy? We are even less sure. So you have to explain to a student, that 90 percent of the universe, 95 percent (or more accurate 96 per cent) is in two ingredients that nobody really understands. This is not really progress!"

They have returned back from these jumps and leaps helpless and incapable, despite the fact that they are now in the beginning of the 21st century, in a very flourishing epoch, in the heart of information age, after only 400 years ever since the telescope was invented.

Nevertheless, they are confessing that they still don't know how big the universe is, nor what lies beyond it. They are differing on whether there are other universes or not.

Arrogance is a frosted street ice, which melts under the sun rays and under the feet of the passing flocks. We are seeing now that the world is awaking from a sleep of self-conceit to the wake of mind and logic. They have become humble, and their views about the universe have radically changed.

The science has discovered many secrets of the cosmos. But eventually after the scientists have delved into the depths of the universe, and have encountered face-to-face what has bewildered and puzzled them, understand now what God says Koran 67.3-4:-

"He, who created the seven heavens one above another: no want of proportion wilt thou see in the Creation of (God) Most Gracious. So, turn thy vision again: seest thou any flaw?

Again turn thy vision a second time: (thy) vision will come back to thee dull and discomfited, in a state worn out."

In this book, my dear reader, you will see how NASA scientists and astronomers gradually progressed into the depths of the space, until they confronted secrets they never imagined in their wake neither they dreamed of in their sleep. These are secrets that defied the cleverest of the scientists, to which they found no solution.

I say it with surety that Islam is an enhanced enlightened way of thinking much more advanced than science. We are in a position to address the pioneers of the scientific progress, in order to argue lofty ideas and advanced theories of great scientists of high caliber, like Einstein.

I say it also with certainty that Islam is in the frontline of all civilizations of all ages. You will come to know in this book that the Holy Koran and our high caliber scholars have far surpassed and preceded the most recent scientific discoveries by 1400 years, and have foretold the secrets of the universe with their amazing and stunning clairvoyance.

My great master, Sadiq Anqa, had forecasted that the 21st century will witness the spread of IRFAN - the Islamic science of self-cognition - which is the gist and essence of Islam.

In this book, I am going to adopt the technique of Imam Sadiq – who was a great Islamic Scholar living 1200 years ago - in addressing the Unbelievers and their minds, logic, reason and innate intuition, in order to gratify their dire need to break open the cage of their mundane mentality, and fly high in the skies of Self-Cognition.

Today, we have lots of achievements and accomplishments in the form of discoveries in the unknown realm of space

and astronomy; namely, stars, galaxies, quasars, black holes, dark matter, dark energy, etc. We can cite them as evidence to prove what we say, and encourage the world to make breakthroughs and achieve Leaps of Faith.

The traditional astronomy was concerned about stars and their positions in the dome of the sky, revolving with the celestial globe around the Earth, as presumed by ancient astronomers, who considered the Earth for many centuries as centre of the universe.

It was concerned also about the planets of the solar system, which they presumed orbit with the Sun round the Earth, particularly, Mars, Venus, Jupiter, Saturn and Mercury.

It was also concerned about the planet Earth, and the natural phenomena originating from the sky but taking place on Earth; for example, matters relating to eclipse of the sun and moon. The forecasts in this respect necessitated knowledge of the movements of the sun through the signs of the zodiac, lunar movements across its orbital path round the Earth, and different lunar phases at different times.

Therefore, astronomy was common among the Muslims, and deep-rooted in their civilization. Muslims were concerned about accurate minute lunar movements, and the lunar exact precise positions in the sky, because Islam counts lunar months for its seasonal yearly commands like fasting and pilgrimage.

Also, Muslims were concerned about the accurate tiny solar movements, and the solar exact strict positions in the sky, since Islam depends on these positions very meticulously for its daily commands like prayers at certain times of the day.

After Galileo, Kepler, Newton, etc., astronomy emerged

out from its traditional bottleneck and entered into another bottleneck; namely, into the details of our solar system, until the advent of the 20th century, when this science entered into the phase of leaps and jumps, after Einstein pronounced his special relativity in 1905 and general relativity in 1918, and after Edwin Hubble announced the theory of the expanding universe in early twenties.

Ever since, the scientists were concerned about galaxies and black holes, which were suggested by Einstein theoretically for the purpose of scientific research.

Due to this special concern about the galaxies, the scientists arrived in the thirties of the 20th century at the existence of "dark matter" within the galaxy – matter which cannot be seen nor felt by scientific instruments - rather it has mass, weight and force of gravity.

They presumed "dark matter" in order to explain the strange movements of the stars in the galactic disc around its center; particularly, the fast movement of the stars in the vicinity of the nucleus of the galaxy.

It was imperative to presume that "dark matter" exists; otherwise, the stars would fly away and scatter and disperse into the sky away from the mother galaxy, under the influence of the centrifugal force.

It was necessary to presume sufficient gravitational force to counteract this centrifugal force, preserve the balance within the family of the galaxy, keep the cohesion and coherence in these intimate family relations, and cause them to hold and cling together.

The mass of the stars and the whole galaxy consists of only 13 percent of the total mass required to counteract the centrifugal force. The rest 87 percent was missing – these ratios are from the budget of the matter only.

Therefore, the scientists presumed that the apparently missing matter is a matter that already exists within the galaxy, but could not be seen nor could be felt by most advanced sophisticated scientific devices and appliances. This matter is not responding whatsoever to any such tools and instruments; therefore, it was dubbed as "dark matter".

The scientific race started in late fifties of the 20th century, when Soviet Union launched a satellite in 1957 to the outer space - out of the global atmosphere and the Earth gravity - which was inhabited by a dog.

However, the Soviet Union launched another satellite at the advent of the sixties, but this time it was inhabited by a Human named (GAGARIN). He became a hero at that time, and received full coverage of the international media. People all over the world rejoiced.

The race had culminated between US and Soviet Union and the cold war intensified and reached its highest point. The people all over the world considered the event as an insult to US.

I remember, I was in Kuwait at that time as a young boy, and wrote to my father in Muscat to this regard, informing him how the human science had been able to overcome the force of gravity, and launch a living human to the outer space. He replied that before 1000 years IBN-ARABI had traveled to the seven heavens, whence he came back.

The race had intensified between the great powers, and the heat flared up to the peaks when a human - this time an American named Armstrong - was the first to land upon the moon in 1969.

The Italian Marconi had invented the radio at the advent of the 20th century, and ever since it was the major means

for global communication, since people all over the world began listening to the world news through this magical apparatus, while reposing at their homes.

But ever since sixties and seventies another kind of global communication came into play. People all over the world started viewing live pictures at their homes from different parts of the world through the television.

People in US, Canada and Europe were viewing alive the human landing on moon in 1969, for the first time in human history.

As for me, I remained awake all the night until dawn, witnessing this historical event, moment by moment, although via a radio. I was listening to the news with tremendous excitement.

I spent the night under the sky, and the radio was at its loudest, and the uproar of this breaking news was exhausting the treasures of my sleep, until two men - Armstrong and Adler - landed upon the moon, for the first time in history, just before daybreak and prior to the outbreak of the aurora.

The rejoicing nightingales were singing inside my heart and the breaking news were knocking upon the door of my sleep – news that rumbled for the first time in the human history.

I went to bed when the birds have not yet risen from their sleep and departed from their nest. After a short nap, I was wide-awake once again, when the sun had emerged from its rest-place, and started wiping out dust of darkness off the face of the Earth, and began painting the nature with its golden rays.

In the coming few days, I was felt as light as a butterfly,

as if a heavenly breeze had tickled my body. This feeling overwhelmed all my senses and all my thoughts. It was a great historical event in the human history, which was viewed with full appreciation all over the world. In those few days, I was tottering like a drunken man under the impact of the incident.

These episodes had inflamed global zeal, which reflected over the respective governments. Henceforth, the western states assigned high budgets for different projects of satellites and space observatories.

At that time, I was studying in the university, and was hearing some students harshly criticizing the wealthy nations for spending millions over these discoveries, whereas there existed on Earth different kinds of unrecoverable diseases, and millions of hungry people, who deserved these huge and bulky budgets more than anything else.

I started explaining to them the dazzling impact of these scientific discoveries over the future of the humanity. They never imagined that the era of personal computers, mobiles and internet is impending, and that the epoch of different TV global channels would replace very shortly the local TV stations, and that you would repose and relax at home watching thousands of global TV channels through this magic box. All these have been accomplished thanks to satellites.

Ever since, the space observatories had commenced sending photographs of remote stars, galaxies, quasars, etc., to the Earth in visible light as well as in radio waves, X-rays and Gamma rays, etc.

The science of space and astronomy moved forward, not in steps, neither in strides, but rather in jumps and leaps. The science giant has awoken from lethargy, and has marched

with colossal steps that have shaken the world, and have caused the Earth under it to jolt and jerk. Seasons would come and go, and years would lapse, before you find what this giant has done.

Have you seen the kernel of a fruit? The future tree is hidden in it. In due course, the invisible tree will become visible and emerge tall in front of our eyes, rich in fruits. **The abundance of fruits is forthcoming, not in material form only, but in spiritual form also.**

The computer was existing in sixties and seventies, but it was too bulky, that would fill up the whole room with its colossal devices and complicated cables. It was therefore owned by the corporate companies. The individuals had not yet enjoyed this magic tool neither had they reaped yet its huge potentials. The first personal computers emerged in the eighties, and used to be called APPLE.

After the most prominent space observatories, e.g., Hubble, Chandra, XMM Newton, etc., were launched and set to their orbits in the outer space, in the nineties of the 20^{th} century, live photos and endless scientific data started streaming down to the stations based on Earth, and fed directly to computers, which had been well-developed in the nineties, and then sorted out automatically.

Without the computers it would have been very difficult to classify the endless stream of the photos and scientific data, the categorization of which would have taken very long time if it would have been handled manually.

For example, for the famous astronomer Johannes Kepler of the 16^{th} century, it took 30 years to classify the bulky astronomical data left behind by the Swedish astronomer Autohan, and to calculate the astronomical figures, in order to finally deduce his three famous laws known as the Kepler Laws in astronomy.

At those times there were neither calculators nor computers, nor slide rules, nor even logarithm tables.

These astronomical figures, which were left behind by the Swedish astronomer Autohan, were manually multiplied, divided, added and deducted by the German astronomer Kepler.

If Kepler would have lived in our days, in the age of computers, it would have taken him 30 minutes only instead of 30 years of his precious age. Perhaps the super computers scientists would say that it would take no more than 30 seconds.

Equally important was the internet, which was fortunately common and widespread in the nineties of the 20th century, and which was vital for the process of global exchange of endless live photos and scientific data.

The science giant continued walking at wide strides; and after a lapse of a few years it entered into the gates of the 21st century.

Ever since 1995 beautiful and wonderful photos were streaming from (HUBBLE) down to the Earth, and we really enjoyed them.

A hidden supreme power was preparing for us a pompous feast and vivid boons, in the form of peerless discoveries, unprecedented in human history.

We were suffering from the blight of arrogance, haughtiness, vanity, self-conceit and vainglory. Now, the science has become humble because it has confronted the immensity of the unknowns, and has found that 96 percent of the cosmos is not responding to its most advanced sophisticated tools and instruments, and therefore called it dark.

In late nineties the scientific society had been confronted with a big surprise that cannot ever be wiped out from their memory. In late 1997, two scientific NASA teams were independently investigating photos taken by (HUBBLE) from the so-called "deep field view" of the universe more than 12 billion light years away.

They discovered that galaxies do not only expand, as propounded by Edwin Hubble in the twenties, but also accelerate in their expansion; namely, they take distance from each other, not at constant ratio, but that the speed of their expansion increases constantly and continually.

The humanity today is longing for freedom in science and knowledge, which was so long shackled by traditional sociological and philosophical thinking.

Free thinking was blocked up just like a singing nightingale locked up in a steel cage. In the post inspection tribunal era, the freedom of science is progressing towards a noble and holy goal of knowing the truth, and nothing but truth.

The scientific society was dumbfounded by this discovery, the impact of which was like that of a thunderbolt.

The majority of the scientists simply did not believe it, and they underwent a sort of delivery pains, until the new-born child was born.

Ever since thirties they had been gulping the bitterness of a matter that existed but could not be seen, and consisted of 23 percent of the total budget of the matter and energy of the universe.

Eventually they surrendered and co-existed with this "dark energy" although they cannot see it nor can they understand it.

They have hitherto not awoken from the nightmare of the "dark matter"; how can they stand a more crushing blow of "dark energy, which comprises 73 percent of the cosmos; namely, 73 percent of the total budget of matter and energy of the universe.

Yes, they finally gave up, waving the white flag of peace in this new world. This disbelief and hesitation lasted for 3 long years, during which most scientists rejected this new theory of "dark energy".

That is to say, the delivery pains lasted for three years, during which many scientists attempted to raise objections, adopting argumentative methods. Eventually, they could not escape the valid facts; therefore, they bowed their heads in full admission.

They cannot view the "dark energy; neither can they understand it. Nevertheless, this force is exerting its superior and dominant power over the universe for more than six billion years now; namely, before our planet Earth was ever born.

Ever since 6.3 billion years the expansion of the universe started accelerating. Before that time, the deceleration was prevalent, notwithstanding the presence of the "dark energy" in the universe.[3]

What then remains within the scope of the modern science? Only 4 percent of the cosmos!

---

[3] The whole process in the Cosmos is similar to that in the Human beings, who grow physically up to the age of 25, thereafter starts the physical deterioration. In all these phases of growth and deterioration, the soul is the supreme authority, although in the first 25 years the sovereignty and domination is in the form of physical growth, and thereafter in the form of physical deterioration. Similarly, in the universe the supreme authority is "dark energy" Throughout the life of the Cosmos, although in the first 6 billion years the sovereignty and domination was in the form of total domination of the gravity – regionally and in remote areas of the universe – and in the last 6.3 billion years in the form of accelerating cosmic expansion in remote areas of the universe, although locally and regionally the gravity is still reigning.

I have decided to ignore this small tiny ratio in my present book, and focus on the 96 percent of the cosmos.

This 4 percent comprises Sun and its planets, stars, galaxies, quasars, dust, gases, plasma – very hot electrified gases – and others that fill out the entire cosmos. It also comprises cosmic rays, gamma and beta rays, X-rays, infra-red waves, ultra-violet waves, etc., and all other energies that cannot be seen by naked eye, but could be detected by the scientific tools and instruments.

I have chosen only three topics for my book, out of the whole astronomy and space science, those which cannot be seen by naked eye neither can they be detected by the SCIENCE GIANT, notwithstanding the huge incredible financial budgets invested for this purpose, and in spite of the most advanced, sophisticated and sensitive scientific tools and instruments, to which they do not respond at all.

These topics are "dark matter", "dark energy" and black holes – which are part of "dark matter".

I have tried to gather the scientific studies with respect to these topics as much as I could. I have categorized them and numbered them accordingly, for easy reference. They appear at the end of the book as Annexes.

In the Arabic edition of this book, all the stuff is translated and classified in chapters within the book.

My focus on these topics may be because they constitute most of the universe, i.e., 96 percent of it. But there is another reason for my choice, which is worth respect, admiration and appreciation; namely, that most of the universe which defies the huge financial budgets and most sophisticated scientific devices, appliances, tools and instruments that have been invented by genius minds, may facilitate and ease the way to Leaps of Faith.

I believe that 96 percent of the universe, which could not be seen nor could be understood by the humanity, is really a thrilling surprise for many! It may soften many hearts, polarize much ponder, and cause the heart-break faithless world to be submissive and yielding to Omnipotent, Omniscient, Omnific and Omnipresent God.

The vanity is disappearing and the Faith is forthcoming, which would sooner or later vanquish the fallacy. The budding flowers, here and there, from the scientific societies may make **a leap of faith**, and buds may open upwards toward Heavens, and turn away from the mundane world.

"Comprehending this universe," Sweitzer said, "requires a leap of faith into unobservable realms."[4]

The dark mundane nights are becoming darker, whereas the full moon of the truth is getting more luminous and brilliant.

Self-cognition is an applied science by itself, and is named (IRFAN), which means true knowledge. You have to be detached from yourself and from all sorts of bias. It requires total fairness, whereby to delve deep into yourself until you acquire full self-cognition.

It is exactly like a man digging the Earth to take out roots hidden into the depths, where suddenly he comes upon a great treasure brimming with Emerald, Topaz and Corundum. As if the man has unwittingly summoned boons of God and has set his heart to the right direction.

If Lord bestows upon us what the mountains contain in diamond, gold, platinum, silver, emerald, topaz, corundum and other precious stones, and what the

---

[4] Please see the chapter "How did the universe begin" at the end of this book.

seashells contain in pearls, etc., it will be much less than his gift of IRFAN – the divine godsend.

No surprise! Since IRFAN and self-cognition is the core of religion. IRFAN is the truth itself which was bestowed upon the prophets. It is above the sects. It is your inner light viewed by your inner eyes. It is your self-cognition. It is your inner self-experience.

It is not understandable by minds; rather, it is enlightenment in the hearts, and viewing the truth within, as expressed by the great Persian poet, Hafiz Shirazi:

"Wars ablaze between 72 sects, you do pardon them all.
Since they have not sighted Truth and Rightness,
They are preoccupied with stories."

In other words, it is the Supreme Truth propounded by Imam Ali in his golden saying:

I saw Him, then cognized Him, and then worshiped Him!

Or in other place when he was asked: "Have you seen your God?" He replied angrily:
How I worship Him if I have not seen Him!

It is the Great Truth that was propounded by God (QURAN 81.23-24): "And without doubt he saw Him in the clear horizon. Neither doth he withhold grudgingly knowledge of the Unseen".

It is the Dawning Fact propounded by God in the words of Noah addressing his people (QURAN 11.28):

"He said, O! My People! See ye if (it be that) I have a Clear Sign from my Lord, and that He hath sent Mercy unto me from His own Presence, but that the Mercy of His Presence

hath been obscured from your sight, shall we compel you to accept it when ye are averse to it?"

Noah did not fail to advise his people. He gave them examples to learn from and follow the model. But they did not see the Visible Facts and the Mercy of His Presence. So how can he compel them to accept what they cannot see, and what is obscured from their sight, and to which they are averse?

The Divine Will has decreed that this truth be viewed by those who deserve it. It is unfair to throw your gold and precious stones into the swamps! How can you bestow your precious wealth on those who handle it like garbage, rubbish and waste?

In your self-cognition the Sovereignty of God is well-established, after your ego is subdued, and after your mundane attachments are diminished, a target the accomplishment of which requires perpetual hard work and a serious approach.

How different sovereignties can co-exist in yourself? It is a stroke of fallacy, if you ever think that they can co-exist.

There is a very simple test, which I call self-test - much simpler than medical tests - to ascertain whether it is the sovereignty of God which is leading you and reigning upon you, or the other sovereignties relating to ego and different worldly attachments.

The minimum requirement for this test is that you have little self-cognition and a bit of self-control.

For one full day - from morning to bedtime - delve into yourself and see what you think about, what concerns you most, and what preoccupies your mind most of the time.

Whatever is predominant upon your thinking and your concerns is the authority that governs you.

In our religious societies, there are many who pretend that they are committed to Divine Sovereignty. Self-test is mostly meant for them in order to cognize their real spiritual status. If they are not biased they will certainly cognize it, and then try their best to rectify the situation. If they are biased, the unfair people have no access whatsoever to Divine Sovereignty. Pretension and boasting is a major part of the mundane life.

If your predominating concern is money, then it is sovereignty of money ruling upon you.

If love of children is predominantly swaying you; namely, their failure worries you, whereas their success causes you to boast and locks you up in the show-off process, then it is sovereignty of children that commands you.

If your predominating concern is sex, then it is sovereignty of sex having authority upon you.

If your predominating worries are springing from your personal pride and haughtiness, then it is sovereignty of arrogance having power over you.

If family and social problems are your predominant concern, then it is sovereignty of family and social attachments reigning upon you.

Briefly, if worldly matters sway you; namely, the sufferings torture you and the successes draw you mad in self-conceit then you are under the sovereignty of the worldly affairs, not the sovereignty of God.

This simple self-test makes it very clear to you who rules

and governs in your entire self - God or the mundane attachments.

So allegations of the kingdom of God are no more than the rattle of the tongue, unless God is overwhelming your entire thinking.

If God is your major concern and fills out all the crevices of your time - hours, minutes and seconds of your life - then you are on the right track.

But that does not come gratis. One has to take pains of self-culture, self-cultivation, self-development, self-purification and self-transcendence.

The more you traverse this track, the more your love and devotion to God is magnified, and the more your mundane attachments are minimized.

If your purpose in life is to transcend to the Kingdom of God, Domination of God, Rule of God, Reign of God and Authority of God upon you: your thoughts, your mind, your heart, your nerves, your nervous system, your five senses, all your organs, all your cells, all your cellular network, all your molecules, and all atoms in your whole existence, and you push your way forward towards this purpose with diligence, persistence, painstaking and perseverance, then you are on the right track.

In case you face any ungodly interest in your thinking and try your best to face it and minimize its influence whatsoever on your mental and spiritual set-up, by waging conscious war - conscious Jihad against self - and by remembering God consciously, begging and supplicating your Lord humbly and earnestly, until you return back to Him and His Embrace, then you are on the right track.

If your concerns are dispersed in many directions, in

trivial vanities of this world, and you are not focused and concentrated on One God, on Monotheism, then you are unfortunately reigned upon by these trivialities, much remote from the Kingdom and Sovereignty of God, notwithstanding all your allegations and pretensions.

I think God is addressing this Science Giant, who has come out from the Alladin Lamp at the advent of the 21st century, and has collided with the biggest challenge ever faced by science; namely, that 96 percent of the universe cannot be seen, nor can it be detected by most modern sophisticated scientific tools, instruments, devices and appliances.

In other words, most of the universe cannot be accessed by the Science Giant, in spite of the support of all world treasures.

Yes, God is addressing this Science Giant in Koran 67.3-4:

"He, who created the seven heavens one above another: no want of proportion wilt thou see in the Creation of (God) Most Gracious. So turn thy vision again: seest thou any flaw?

Again turn thy vision a second time: (thy) vision will come back to thee dull and discomfited, in a state worn out."

God is not the property of mine, yours or anybody else. No need for partiality or fanaticism. But He is certainly my Creator and my Designer and He is also your Creator and Designer. He is OMNIFIC!

I know for sure that gratefulness for boons and graces of existence and all the aptitudes and powers invested into us, will change our life, enrich our existence and create in us accord and harmony with the Existence itself, of which we are a part.

And more important it will create in us happiness, peace, security, tranquility, calmness and quietude. In simple words, it is our inborn, innate, inherent and inbred need that assures us appreciation of all these boons and graces, and God is utterly needless.

How beautiful is life when you enjoy all this tranquility, recite the songs of the dawning truth and chant the hymns of the eternal secrets into the ears of the perpetual immortality!

How transcendent is life when you brim with love and devotion to your Creator and your Designer, in absolute peace and delicate tenderness, free from mind dispersion and dissipation, unified in mood and purpose, released from insecurity, grateful to Him and utterly submissive to Him in all ups and downs of life!

This is the Unification of Existence in Islam, propagated by the great man of IRFAN and self-cognition, Mohieddin Bin Arabi.

This accord and harmony with Almighty and holy enjoyment in His Vicinity fill in the crevice and gap between us and the Mother Existence, and bring forth in us state of integration, cohesion, adhesion within, and union of our soul with the Great Spirit.

Our soul does not belong to the material world. It is detached somehow from the Great Spirit as a drop of water is detached somehow from the great ocean. The day the soul fuses with the Great Spirit will be certainly a great day indeed, celebrated in vivid ceremony by the angels of the heavens.

If scientists and astronomers come back home from their observations into the universe, and they are not integrated within, and do not enjoy the tranquility that I have

described, and are still hindered, obstructed, impeded and locked up in the trivialities of their day-to-day life, they better choose Leap of Faith to cross and jump over the vanities of life to the world of Salvation that I have already described.

The dissipated state of trivialities is really a chronic disease caused by the sick psychology, which has got torn up and split apart. These crevices of dissociation have to be filled in somehow. Therefore, you are filling the trivial matters of your normal life into the vacuum of your split psychology.

The right radical healing is by removing and vanquishing the negative state of dissociation from the Mother Existence, and not by just filling in the vacuum. The first step is self-conciliation.

Why do you handle yourself crossly? Be relaxed with yourself, and give up your affairs to the Great Power which has been managing the universe for billions of years (without you), and will manage the universe for other billions of years (without you, too).

Is it not better to be satisfied and content? Is it not better to have peace in faith, rather than discontent and dissatisfaction? Good faith is to believe that what has befallen you is predetermined, and what has missed you is also predetermined.

Right! You have to struggle for better conditions, but do it in peace and full satisfaction, because your struggle is also predestined. You are not an exception to the law of "equilibrium recovery". Everything in the cosmos is struggling to regain its equilibrium. Accept and acquiesce in what is preordained.

If you have this Leap of Faith your life will completely change. Real peace and conciliation should start from yourself – from your inner life.

Psychologists say that prophets are masters of psychology. That is quite true. It is as math teachers would say: Einstein is master of math. Psychologist is just a tiny part of a prophet. Let us compare their targets.

For a psychologist the sick man is the one who is not quite fit for mundane life. He has to heal him to bring him back to the normal life.

For a prophet the sick man is the one who is carrying on his back the heavy attachments of the mundane world, and is not quite fit for the happy secure eternal life. He has to heal him in order to detach him from the attachments of the mundane life and bring him back to God – the Origin of all Creation – and convert him from mortal to immortal, mundane to divine, finite to infinite, limited and dying to eternal and everlasting etc.

Which would be better for you to select? If you have heart disease and you have a choice to select between a famous heart doctor and a new medical graduate, which one would you select?

It is better to listen to prophets than to human doctors. They know about the depths of your inner life much better than others. They will certainly revolutionize your life if you listen to them.

Merger with Effluent Existence is accomplished when you remove your state of disintegration and dissociation from Him. You will surely be born anew, as Jesus said: "Whoever is not born twice will not enter the Kingdom of God."

In your second birth you will merge and unite with super, abundant, infinite and effluent Existence, and will be released from finite cages that you have made yourself inside yourself.

See for yourself what great is the difference between finite and infinite! See for yourself the difference between the abundance and the scantiness!

You are weak and unhappy when you are a dissipated and a dispersed person, dissociated from the Great Spirit, and you are strong, straight and happy when you are united with Him!

This is the Unified Existence in Islam propagated by Ibn Arabi, which is real monotheism in action. Most people are monotheist by tongue only, and they are polytheist in reality. Otherwise, how would you describe people who have money, sex, arrogance, boasting and all kinds of life trivialities on their thought and never Almighty God!

The western scientists know better than others that Humans require considerable time for meditation, prayers and worship of God. The modern life is encumbered with work, and there is no time left for yourself to meditate, delve into your self, observe what happens over there and find out its secrets.

Yes, no time at all to observe all this, and then to use positive self-suggestion – or prayers as in religions – to control your ego. If you don't suppress your ego, it will dominate you and drag you to the mundane trivialities of life. Modern life does not condone the wretched captive individuals of the society. It is imperative to change the life pattern to allow more time for prayers, worship, meditation, self-cognition and ego suppression.

Meditation and relaxation – or prayers as called in religion – is your emancipation from the earthly toil, liberation from the frontiers of space-time, and hymns and psalms in the expanse of heavens.

The heart has seasons as the fields have seasons. Level your mind up and down according to the seasons of the heart, in order to enjoy your life, and cause your days to be sweet and pleasant, delightful and charming, and flow along crystal clear like limpid water of a brook, flowing slowly and hobbling over the whiteness of pebbles.

In your meditation and prayers, there lie godly gifts and hearty perfumes of divine mercy. Relax and lie quietly among these merciful currents, and do not pull out of them.

Do not miss their abundant blessing, because they enlighten your hollow dome, perfume your inner expanses with fragrant heavenly scents, play touching music upon the harp of your heart, fill your goblet from the springs of virtue and chastity, perfume your breaths with psalms of the prophet David, and replenish your entire entity with a strange heavenly light, as if it is a torch of Marvelous Divine Light.

If you pray with full presence of heart, and if your prayers put you in a transcendent state, perpetuating in your mood, then secret whispers of angels will not forsake your ears neither hearty perfumes relinquish your breaths.

Prayer is nothing but expansion of your entity into the Great Living Spirit. Let the prayer feed your Divine Love and Heavenly Passion with Glorified Holiness, and cause your heart to transcend to Holy of Holies.

Have your prayers from daybreak to dusk. Look for the secrets of your heart, and recite them into the ears of the

night. How wonderful it is to express the substance of your entity to Him, and summon jets of His mercy in the morning, noon and night!

In prayers, be kind and gentle with your self, do not handle your self sternly, do not subjugate and coerce it, seek peace and conciliation with your self, and pray as per your mood.

If you subdue your mood, you are kindling the fire of inner discrepancies, which you should strongly avoid. Your mood should be your support while praying, because you have to pray with your full entity, with full eagerness and full ardent love and passion.

Transcend over your mortal part, and strengthen your immortal part. Take for yourself a chamber in the high heavens. Appeal to God to preserve you. Solicit Him in full postulation to look after you. Beseech Him to take care of you. Beg Him to spread His Wings of Mercy over you. Entreat Him to guide you to awareness and rationality. He is Generous and Bountiful, and His Treasures never diminish.

A man who is eager to cognize himself, prays with sighs and eagerness, begs God to lay open to him all the secrets hidden in his entity, and expose, disclose and decipher for him all the puzzles and riddles lurking in the depths of his entire self. He melts in a flowing brook that hums into the ears of the night.

In the serenity of the night, the hearts of the worshippers become aware of the secrets of days and nights. In the transcendental prayers, the worshipper becomes one with himself. In his loneness, the worshipper lives in peace with himself, wherefrom emanates great tranquility, which spreads throughout his entity.

During prayers, the perfumes of the soul spread out, and the Soul and Layers thereof are ornamented in pompous clothes. The transcendental state during prayers causes the man of God to reach the following consecutively:

1 - His intrinsic qualities merge into those of God.

2 - His acts merge into those of his Lord.

3 - His entity merges into that of Supreme Spirit.

Imam Ali has said, "With prayers the sins fall down and spread like leaves of the tree. Prophet Mohammed likened it to a hot water spring existing at a man's door, and the man takes bath in it five times in a day and night. What dirt could remain on his body! Men of Faith knew exactly how genuine is the prayers, those who are never distracted from it by temptation of money or delight of children."

SOUL is a Divine Donation. It is a Grant from the Compassionate. He has breathed from His Own Soul unto us, as expressed by QURAN.

Layers of Soul are Magnetic Fluids, prepared in such a way as to become food of the Heavenly Tree, and from which are created the angels and the six superimposed heavens.

We had been gifted with Soul and the Layers thereof to become holy, whereas we have violated these gifts with our own hands. We have desecrated our Gracious Divine Entity with our own sins.

Sanctities do not deserve profaning. It is advisable to inject into each act of ours a breeze of our Soul.

In the next two chapters, I am going to narrate the stories of two French philosophers, who have recently become

Muslims, and quote them from the interviews arranged with them in Damascus.

Religion does not contradict science; it is rather a crowning accomplishment of a scientist and a philosopher. It brings back tranquility and serenity to them, and salvages them from the trivialities of daily life.

It is NOT an obstacle in the way of a scientist or a philosopher to achieve his work; rather it is enriching him and his work with a supreme cosmic view.

Those who have cosmic view have also cosmic incentive for work. For example, those who have a million, then one or two do not captivate their attention. They are preoccupied with something bigger, with a world much greater than their scanty world.

I have called this book, "Cosmos Revealing Unified Will", following on the steps of Imam Sadiq, who used to deal with the Unbelievers by referring to "Unified Will" in the cosmos, in order to eventually introduce them to the truth and authenticity of monotheism, as well as genuineness and realities of Life After Death, or hereafter, or Immortality, or what is called Resurrection.

We will refer in the next chapters to the dialogue of Imam Sadiq with his disciple Jabir Bin Hayyan (called father of chemistry in the western countries) about the Will ruling over the cosmos, and that it is the Quintessence of the Creation and the Universes, and that it has extensions into the immortal life after the apparent death.

He had a firm belief that death is a sort of life, differing in form only from our present life, but NOT in its essence and substance. The ancient conventional wisdom affirms that nothing vanishes; rather it is converted from one form to another.

The modern science has confirmed this wisdom beyond all doubts, since it has been propagating the "law of conservation of matter" from 17th century to 19th century, and that matter does not vanish; rather it converts from one form to another, like ice converting to water, thereafter to steam, and vice-versa, and like other forms of matter converting from solid to liquid to gas and vice-versa, nothing missing in the process.

And as in chemical reactions, some elements disappear, but instead new elements emerge during these reactions. For example, certain quantities of carbon and oxygen disappear, but instead another form of gas emerges; namely, carbon dioxide gas. Or certain quantities of hydrogen and oxygen disappear, but instead there emerges another form of matter; namely water. Formulas in chemistry are based on this wisdom.

At the advent of the 20th century, Einstein expounded the "law of conservation of matter and energy" by his famous equation E=mc2 where E=Energy and M=Matter and c=speed of light.

He proved that matter converts to energy and vice-versa, nothing missing during the process. Thereafter, great researchers in science followed the track. Eventually, it was practically proved that fertilized uranium converts to immense energy, e.g., atomic bomb or hydrogen bomb. Also if this huge energy is controlled in atomic reactors, it could be used in peaceful ways, like generation of electric power, etc.

Will in the Existence is quite evident and obvious and requires no proof. It is a matter of INTUITION. How can anything emerge to existence, or any event occur in the existence without Will? Is it logical that anything is created without Will, or anything occurs without Will? Is

it rational that the cosmic events occur randomly without any law or wisdom or reason behind it, or without a Wise Will with Wise Purpose?

Will manifests in cosmos in the form of laws, and in the perpetual process of preservation of these laws. If we presume - although absurdly - that some speck in the universe abstains for a moment from obeying these laws of Supreme Will, the whole universe will vanish and disappear.

Is it possible for example that anything would refrain from obeying the law of gravitation? It is certainly an obvious absurdity!

It is right that a bird flies, apparently defying the law of gravity. It is not so, since it counteracts force of gravity with the force of floatation of "Archimedes Law". Same is valid for the flying human machines. It is in fact equilibrating one law (force) against another.

As far as the perpetual process of preservation is concerned, we set the following examples:

If heart beats in living creatures are due to Supreme Wise Will, then each heart beat is in dire need of Will to preserve it also. If the heart ceases to beat partially, then Will has predetermined that there should exist a warning system in the living creatures. Therefore, heart disorder is the warning that there is some defect somehow, so that the person concerned should try his best to set right this accidental disequilibrium.

If heart beat completely stops, then life comes to a halt and converts to death. That means the law of cycles applies now: namely, that each process in the cosmos has a certain cycle of life.

So is the case of breathing in living creatures, which is the act of Wise Will. Each breath is in dire need of Will to preserve it also.

If the breath partially stops, Will has predetermined that there should be a warning system in the living creatures. Therefore, asthma or any other breath disease is the warning that there is some fault, so that the person concerned should heal that emerging disorder.

If the breathing completely stops then life comes to a standstill, in obedience to the law of cycles.

So is the case of blood circulation through veins and arteries, which is the act of Wise Will. Blood as well as the carrying vessels - veins and arteries - are continuously in dire need of Will to preserve and safeguard them against any deficiency.

Each drop of blood at any place in the veins and arteries, as well as the veins and arteries themselves, are in dire need of Will to preserve and safeguard them.

For information, the veins and arteries in your body alone are the longest thing on the Earth; namely, four times the length of the circumference of the globe. So just imagine the probabilities of any blockage throughout this gigantic length! And imagine how huge is the perpetual need for Will to preserve this status and prevent any contingency!

If there would be an impediment in any tiny point in such dramatically long veins and arteries, or any flaw in the flow of blood itself running for more than 200,000 kilometers in every circulation, then Will has predetermined that there should be a warning system in the living creatures, whereby pains or any other signs would warn about the casualties within - clot at the heart or brain, etc., so that the patient may take care of it.

If the blood circulation stops completely, then life comes to an end and the law of cycles is applicable.

Also, Unification of Will is quite conspicuous. For example, if I breathe, it is not at my will. If you breathe, it is not at your will, too. If all living creatures breathe, it is not at their will also.

Then it is at whose will? That is exactly the Unified Will.

Or for example, if my heart beats, or if my body needs sleep, it is not at my will. If your heart beats, or if your body needs sleep, it is not at your will, too. If all living creatures have beating hearts, or if their bodies need sleep, it is not at their will also.

Then it is at whose will? That is exactly the Unified Will at action.

It is really strange that all individual entities in the universe, in all cases, shout and say - (I). The sleeping entity says: (I) sleep. The breathing entity says: (I) breathe. That who has beating heart says: (my) heart is beating. That who has blood says: (my) blood. That who has veins and arteries says: (my) veins and arteries, etc.

So every entity and member of cosmos says: (I); what that means really? This (I) is ONE in all existential entities.

So every existential individual claims (I) for himself. We searched for (I) everywhere and found that (I) is representing that One Monotheist having Omnipresence, who commands what He wants in dignity and superiority.

Every individual member of the cosmos has been apportioned very minute tiny portion of commanding, wanting, dignity and superiority.

We also noted that the same act or state is repeated billions of billions of times at any place and time.

For example, sleep is a state that is repeated billions of times for billions of creatures. Likewise, the heart beating is a state or an act that is repeated billions of times for billions of creatures. Also, breathing is an act that is repeated billions of times for billions of creatures.

Same is applicable to blood circulation throughout veins and arteries, and to other states and acts. Every existential individual claims the same act or state for himself.

It is obvious that One Unified Will is behind all that, achieving all this with utmost wisdom, which is beneficial to all the individual creatures, and help them live their lives properly, and complete their respective predetermined cycles of life and death. He achieves all that with purpose and wisdom.

The generalized cosmic laws demonstrate that there exists One Unified Will ruling the entire cosmos (and other infinite universes suggested by some scientific theories).

Modern science says that Big Bang took place, and cosmic laws were created. That means tacitly that One Unified Will is reigning all over.

It is a fundamental truth taken for granted, and also a matter of intuition, that nothing can occur randomly in the Existence.

Also science is based on fundamental questions of what, how and why, which is the gist of science.

It is evident that such approach proves that this Unified Will is Wise. Therefore, there emerge theories in science explaining the wisdom lying behind all cosmic events.

Sciences in all civilizations of the human history, particularly the western modern science, are based on innate curiosity within the humans to learn what they do not know. All this inborn curiosity expresses itself in three inherent questions: what is this thing, event or state, etc., why it occurs or why is it there, and how it occurs or how is it there?

These fundamental basics are a tacit confession with regard to the wisdom of Supreme Will in perpetual action in the universe.

No matter how far a human being persists and overdoes in denying; nevertheless, he cannot deny his own inbred nature within, confessing Monotheism, upholding One and Only Lord, Omnific, Omnipotent, Omnipresent and Omniscient, ruling and reigning over the whole existence, with Wise Unified Will and Sovereignty.

Probably someone may pose a question, "What is the relation of IRFAN – science of self cognition – with the science of space and astronomy?"

In response, I would say that IRFAN is a science of self-cognition, and the modern science has not so far expended billions of money in order to study the human soul, spirit, psyche, mind, nature, character, instinct, and native human intuition. Whereas modern science has in fact spent billions of money on most progressed sophisticated devices, appliances, tools and instruments, as well as on thousands of genius human minds, for the purpose of studying space and astronomy.

But we do know that human being – so often known in history as a talking animal – is actually a miniature of cosmos. That is to say, the human being contains what the cosmos contains, although in miniature form.

Einstein as a person is a good example to offer for my theory, since he contained within himself all the cosmological facts and realities, e.g., space-time fabric, black holes, cosmological constant, etc. We all do have all this, but it requires some personal transparency, insight and clairvoyance to detect them. Einstein had that indeed.

The space sciences have taught me IRFAN or science of self-cognition. It is not taught in religious schools. It is taught in the school of Unified Existence and Unified Will. Self is your own book which you should read from A to Z. (Koran 17.14):

"Read thine (own) book, sufficient is thy soul this day to make out an account against thee."

The only requirement for the study of Applied IRFAN – not theoretical IRFAN of course – is to know for sure that we – humans, cosmos, and all Existence – are one family, and whatever applies to the cosmos applies to us human beings also.

In the olden times, there lived prophets and messengers of God, who had Mission to appeal to their people – and in one case of prophet Mohammed, to the people of all the worlds – and summon them to God and worship of God. Apparently, they enjoyed a strange, amazing insight and clairvoyance, and they were seeing things which were hidden from others, as if they had some inner eyes, that others did not possess.

Some people were inclined to them, and believed in them. It seems that these people had some different sort of insight and clairvoyance, since they were feeling something in their selves.

Therefore, they believed in the prophets and the messengers

of God, and their hearts and minds were inclined to God, although they could not view what prophets viewed.

From among these few emerged a minority of men of God who were seeing something in their selves, although not so crystal clear as the prophets.

They were humming heavenly anthems, and reciting hymns of secrets into the ears of Eternity. They are few in this world, in which good people are scarce and bad people abundant.

There was a third group who constituted the majority of followers, who were feeling something, but not so sublime to fully believe in the prophets and the messengers of God. Nevertheless, they pretended to have full faith. QURAN explains to them as follows:

(QURAN 49.14): "The desert Arabs say: we believe; say, ye have no faith; but ye (only) say: we have submitted our wills to God, for not yet has Faith entered your hearts; but if ye obey God and His Apostle, He will not belittle aught of your deeds, for God is Oft-Forgiving, Most Merciful".

Because submission is one thing, and faith which intermingles with the heart is something else.

We may describe these stages of "**incomplete feeling**", "**complete feeling**", "**witness**" **and** "**seeing**" as did Imam Sadiq when he said: "QURAN consists of four conspicuous features: **style, gesture, delicacy and truth**. Style is meant for the majority (incomplete feeling), gesture for special ones (complete feeling), delicacy for men of God (who witness) and truth for prophets (who see the genuine truth).

Long years elapsed, and there emerged the modern science

with all its wielded powers, at the end of the 20th century, when they passed through the Earth atmosphere, subdued the force of gravity and penetrated into the outer space, with most sophisticated satellites and space observatories, equipped with the most sensitive tools and instruments, and wielded them by their genius minds with remote control.

Since they were empowered by mighty enormous wealth, no nation dreamed of throughout the history, they spent billions and billions for the sake of scientific explorations, particularly those of space, and spared no cent for this purpose.

They took terrible pains to traverse the precipitous paths, trample the adventures, and pass through the pathless, with trial and error methods, that cost them much; but eventually the humanity reaped very valuable fruits, that could have very impressive consequences in the human future.

There gathered in their power and authority; the laughter of thunder, the tears of rains, the dance of trees, the roar of winds, the growl of sea waves, the darkness of clouds and the waves of the fog.

Their imagination rose up lofty upon the mountains like eagles, and their thoughts roared like stormy seas. They embraced the space with their arms, encompassed and circled the orbits, wielded the galaxies like bows, and comets and asteroids like arrows.

They flew aloft into high skies, shone on our world with splendor of rare sciences, rose on us like a moon in stormy nights with frown of arrogance, and overran us with floods of overriding tyrannical power.

They are not intimidated by any power, neither are they fatigued and overpowered by anybody, since they have authoritative minds and possessive ideas.

But in the depths of their hearts lies a great fear. They expect stormy winds to break down the sails of their vessel, which voyages through stormy ferocious seas, overwhelmed by fog.

It is civilization, shaken and upset like a vessel, encompassed by tyrannical storms of the seas, and thrown here and there by wild and violent winds; a vessel which fears to be smashed and shattered horribly.

They released the birds of their dreams from the cages. They poured down their rivers into the seas, unobstructed by lofty rocks and mighty dams.

But eventually they reached the heart of the oceans, and were swallowed down by their haughty waves.

Their minds are confounded in the science of space, and their strength weakened. They have stopped argumentation, and humbled before the unlimited cosmos. They are just stunned, puzzled, perplexed, confounded and bewildered.

The civilization enters a house as a guest, then converts to a host, then becomes a violent tyrannical dictator.

Even a civilization has a cycle, and the "law of cycles" applies to everybody and everything, everywhere and every time.

There was a time when Islamic civilization was worldwide, and now western civilization has turned global. And no surprise tomorrow other features would be prevalent.

Causes react and consequences emerge out. God has not created anything in vain. Everything moves throughout the history under the control of His Wisdom.

Pains of frustration have to crush the crust of the civilization, before they come to know the facts of life, and amazing secrets of Allah. Is it possible that things go otherwise?

With this power and authority, genius minds and genuine love for knowledge, they have found "dark matter", but they never discovered it! How could they discover it when it cannot be seen, viewed, or felt? It does not respond, whatsoever, to their most sophisticated advanced devices, and the most sensitive scientific tools and instruments!

Rather they have admitted and acknowledged that it certainly exists; otherwise, the galaxies would fly apart and get dispersed and dissipated, and universe would never stand as it is now!

They have found from numerous studies that "dark energy" had overpowered gravity ever since 6.3 billion years – that is to say, before the Earth was ever created. They have found that it rules over the remote distances, whereas gravity reigns locally.

Cosmic expansion theory was propagated by Edwin Hubble ever since twenties of the 20th century. But, in 1997, they found out that remote galaxies are pushed away apart, and the expansion is not going on at constant rate, but at an accelerated rate; that is to say, the cosmos is accelerated in its expansion, which means the expansion rate is ever-increasing.

They did not know the reason. That is why they presumed

that an unknown energy should be at action, and therefore they called it "dark energy".

They have admitted and acknowledged that it certainly exists, because they have found out that remote galaxies are increasingly taking distance from each other.

To where the universe goes at this tremendous acceleration rate, nobody knows!

However, according to our theory that man is a miniature of the cosmos, and that whatever exists in the universe exists also in the human being or vice-versa; and since man has soul and the layers thereof; therefore, it is quite clear to us that "dark energy" in cosmos is corresponding to Soul in humans, and that "dark matter" in cosmos is corresponding to Layers of Soul in humans.

For information, there are many Layers of Soul existing between Soul and the tangible material world. Halo which is found round the faces of the saints is just one example. Likewise, magnetospheres of Jupiter and Earth, discovered by space science during the last ten years, are other examples.

Space science has given us now the exact ratios; namely, that Layers of Soul constitute 23 percent of our entity, whereas Soul constitutes 73 percent of our entity – exactly as "dark matter" constitutes 23 percent of the universe, and "dark energy" 73 percent of the universe.

We do know for sure that human being is a miniature of the universe, and contains whatever the universe contains at the same ratios.

My father Sayid Husain, well-known in our society as "Aalim" – means learned – says in his book called "Majalis",

which I have mentioned in my Arabic book called, "A Model Religious Scholar" on page 355 – which was later translated by me to Persian Language – the following:

(Among the animals, the human being, who is more marvelous, more brilliant and wiser than other kinds of animals, suggests quite conspicuously the existence of Supreme Creator. Human being is not only miniature of the universe, but also of the Kingdom of God as well. He is an abridged copy of the Great Divine Book.

The entire universe is a big book containing all information. The creator of this book is Allah, the master of all universes. Human being is just a miniature of that. Whatsoever exists in this great world exists in the small human also.

So human in his external form is a small book i.e. a miniature of that big book. But human in his interior form, and as far as perfection, full awareness, partial awareness, mental and sensible perceptions are concerned, is a great book like the great world itself. He is yet greater as confirmed by Imam Ali addressing the human being:

"You are the revealing book,
Whose verses manifest hidden world.
You think you are a little speck,
And within you lay a greater world.")

We hereby proclaim that Layers of Soul, which lay between Soul and the material body, are found by the modern science, calling them "dark matter". Also we proclaim that Soul – which is a divine affair – has been finally found by the modern science, calling it "dark energy".

Yes, we said they have found them, and we did not say

they have discovered them. How could they discover them when they cannot see them neither feel nor touch them?

Yes, they have found them in the sense that they have admitted and acknowledged them, and now they have full faith in them.

God has willed that the modern science should find after the many hardships of scientific research and adventures of trial and error into the unknowns, what the prophets and the men of God were seeing - and continue to see - crystal clear on the screen of their hearts, expressing these facts in full determination and resolution, and relentless certainty and surety, without any shadow of doubt.

In this book we will take you with us to a voyage through NASA's latest discoveries in space science in the last 20 years, which would end up to the unexpected amazing secrets that were propagated by the prophets and the men of God, whose knowledge penetrated the depths of the facts, truths and realities, that are certainly available in the cosmos and in the human entity, but could not be detected by ordinary man.

Now science with all its team work geniuses, accumulated knowledge, very sophisticated spacecrafts and scientific tools and instruments, has been able to detect these wonderful eternal truths.

Those who have traversed the depths of human entity, and voyaged through the unknown world of self-cognition, feel in themselves the force, effect and impact of Layers of Soul; and perhaps some of them who are enjoying full Salvation, can even somehow see them - not of course by the sight of eyes, but rather by inner

sight of soul, which is much more crystal clear than the sight of eye.

To explain the **inner sight of soul**, let me give you a simple example. You may have experienced some dream, the sight of which is so clear and impressive in your memory, that you may not forget it at all, rest of your life. Those who have seen such a dream may have full faith in what I say.

There is a chapter in this book called "Soul from point of view of Islam" which proves that dreams - particularly the true ones - are sighted by your Soul, which you may read later.

All that occur to us originate from Soul and the Layers of Soul, but most people do not feel them, nor heed them, nor realize and understand them. **The impact of Layers of Soul is so conspicuous and tangible in us, but we don't heed them, because we are brain-washed by names like genes, nervous system, etc., which are but the material copies of Layers of Soul.**

Imam Ali describes such people saying, "Fallacy has clutched at their minds and reason, and ignorance has obscured their sight. They are not open to the lights of wisdom, nor are they inclined to penetrating knowledge."

If anything occurs to them they would attribute it to normal matter, e.g., limbs of the body.

They must know that limbs, etc., are just tools used by Layers of Soul. **They should know that they themselves are Souls and Layers of Soul, although they move to and fro with their body and their limbs.**

That one who speaks, hears and sees is the Soul; and

tongue, ears and the eyes are just tools used by Soul and Layers of Soul. Otherwise, how can a piece of meat speak, a piece of bone hear, and a piece of fat see?

Soul is the one who plays the harp of the tongue, rings the bell of the ears and vibrates the strings of the sight nerves.

Soul is manifesting as your power and your attempts. That who is wielding powers in different forms is soul and soul alone.

Whoever knows this truth with the certainty and determination of the prophets, and whoever experiences this reality with the clairvoyance of the men of God, is the one meant by God in His Holy speech[5] saying:
"When I love him, I become his sight by which he sees, his ears by which he hears, his tongue by which he speaks, his hands by which he wields powers, and his feet by which he strives and endeavors. Then by me he sees, by me he hears, by me he speaks, by me he wields powers, and by me he strives and endeavors, and whenever he asks my help I do help him, and whenever he prays to me I do respond to him."

Imam Sadiq has said, "The human face is the straight way to all good, and it is the bridge between paradise and hell."

Certainly the people are preoccupied with the animal faces, and distracted from Human Face. They occupy themselves with the material bridges, and distract themselves from the bridge extended between paradise and hell, which is Soul and the Layers of Soul.

All this exist within you, deposited by God into your entity, for which you are responsible. Just see how you

[5] Holy speech is a collection of Godly speeches addressed to Prophet Mohammed, and brought along by him during his return from the holy voyage through the heavens in his famous "Ascension Night".

will handle this divine trust and consignment!

You are crossing this bridge, where feet so often slip and stumble, where horrors of errors simmer, and where mortal adventures are abundant. Are you going to pass across it safely, and take along with you the supplies and provisions for the Hereafter and the next immortal eternal life?

The Author
Taqi Husain Al-Musawi
20/4/2010
Mobile No.0096899419461
P.O.BOX No.920 p.c.114
Sultanate of Oman
Website: www.taqimusawi.com

French thinker adopting Islam

As promised in the preface of this book, I hereby narrate the story of a French thinker, who has recently adopted Islam, and who has appeared in a press interview. This chapter may be considered as a part of the preface.

The French Thinker, Dr. Michel Pertron, is a holder of PhD. in history and law. He is a director of a French journal called "Knowledge of Religions", and he is a member of "Asian Society of Oriental Christians".

He was an officer in French Marine in years 1966 to 1969, then a consultant in French Radio and Television in years 1971 to 1975 and then a consultant in European Council in Strasburg in years 1976 to 1980.

He has been converted to Islam lately and his name is changed to Ahmed.

The interview has appeared in Al-Watan magazine of Oman dated August 18, 2009, and was conducted in Damascus by Wahid Taja, who reports the following:

We met him during his visit to Damascus, and our dialogue focused on his faith and the factors conducing to his adoption of Islam.

- Question: Could you speak about the developments in your religious knowledge?

He answered: I was bred and brought up in a Christian Catholic family, and was committed to worship until my adulthood. During that period, I started posing questions on myself about my religion, which caused me to somehow forsake practice of worship, and show interest in other religions, particularly religions of Near East and especially Hinduism and Buddhism.

I found spiritual elements in these researches. Simultaneously, I confronted many contradictions and difficulties in Buddhism and Hinduism.

It appeared to me that Buddhism is a search for wisdom more than a search for God, whereas Hinduism is taking the spiritual direction in approaching God.

After all these experiences which I practiced in Buddhism and Hinduism, I reverted once again to my original religion - Christianity.

I delved deeper into Christianity, putting forward the facts and questions that if there is enlightenment in oriental religions, it should exist also in my religion, especially in my Holy Book Bible.

Therefore, I deepened my faith and pursued towards spiritual seclusion in the hermitages.

- Question: To where these seclusions led you?

He answered: These seclusions were a positive experience for me, since I really pursued worship of God and prayers.

I had sufficient time for meditation. But this experience showed me some contradiction in my life as a Christian clergyman.

I noted that ordinary Christians cannot live the life of hermitage every day in their practical life. This motivated me forward to search for a process conciliating between my practical day-to-day life and my life of meditation, seclusion and asceticism.

- Question: It appears that you had a problem in unifying your life trend?

He answered: It is true. The problem in Christianity is to conciliate between meditation and worship of God and our natural daily life, which we should live in this world.

It is natural that a man should marry, bring forth children, have a normal family life and fulfill his family and social commitments. Therefore, he cannot live life of meditation because of his worldly preoccupations.

Subsequently, there emerges a big difference between those committed to religious life and those practicing normal day-to-day practical life. This contrast really harassed me much and caused me many problems and difficulties.

- Question: What things attracted you in Islam?

He answered: Perhaps the major things that attracted me to Islam and had a lot of impact on me are:
1 - Powerful and genuine faith.
2 - Submission and surrender to God.
3 - Brotherhood between Muslims.

- Question: As far as faith is concerned, what kind of power did you feel most in the faith?

He answered: What touched me most is the huge power of the prayers. Islamic prayers have a great power. I felt

also real and alive brotherhood, which I found prevailing among the high levels of Muslims.

- Question: Do you mean by the power of prayers that holy feeling of the vicinity of God during prayers?

He answered: The power of Islamic prayers initially originates from the holy language used in the prayers; namely Arabic which is the language of Divine Revelation, and which has a great impact upon me.

I may also affirm the fact that it has an effect upon my body as well. When the time of the prayers arrives, I feel something spiritual descends upon my person like a deep sound summoning me to prayers.

I don't feel at all that it is a compulsory thing imposed and coerced upon me. Rather I feel it is an obligatory assignment and an act of submission to God, and a voluntary task and a freewill obedience of God.

I don't feel at all that it is a forcible duty enjoined upon me from without. In this lies the spiritual power of the Islamic prayers.

- Question: What is your opinion about some Frenchmen saying that to live in north frosting pole is much easier for us than praying five times a day?

He answered: Such a behavior affirms the fact that people are afraid to surrender to God, because that restricts their life to a firm moral pattern of life, bringing forth radical changes in them. Such moral engagement intimidates people.

- Question: What have you accomplished by adopting Islam?

He answered: What I have accomplished from my adoption of Islam and during my Islamic experience is my conviction that I am on the right path. Consequently, my life perusal had different direction in the light of this rightness. I came back to read my life in a different way. Whatever appeared to me in Islam before as compulsory obligations which looked difficult to practice, became now all at a sudden an absolute necessity for those who obey and love God, and for those who seek to be slave of God, in full obedience to Divine Revelation, revealed by God to his prophet Mohammed.

- Question: What about the next world and the relations between Muslims to which you hinted?

He answered: This matter has revolutionized my life and my relations with others, since I have lived and experienced these facts with friends, who have become now my brethren.

I can say that real Christians now are Muslims, since they are applying what Jesus has demanded from them; namely, attachments and brotherhood between each other.

This is deeply moving and thrilling to notice how much I am loved by brethren, who consider me as one of them; although I am a stranger to them. This feeling of ease and security and love is a great thing indeed.

In general, Islam has changed everything in my life, e.g., my suspicions have transformed to certainty and assurance, and I have revised my life in the light of this conviction.

It is worthwhile to mention that revelations of Koran have become facts and realities for me, which I was previously suspecting, and around which I was posing quite a lot of questions.

Consequently, what seemed to me in the past as imposed teachings and commands, are considered by me, after I adopted Islam, as religious duties, divine precepts, surrender to God and holy relations with men of will and strong faith in God, preoccupied in good deeds that God expects of us.

In the past, I was refusing them, because they appeared to me as dictations.

Therefore prayers and Islamic commands appear to me now as my own personal needs and necessities, and not as coercive actions.

- Question: Did you have contacts with Islamic personalities?

He answered: Yes! This is too important to me to have contacts with very influential Islamic personalities, especially Najmoddin Bamat, ex-director of culture in Unesco. He is a learned man with vast knowledge, and is also a pious and a devoted Muslim. He is very close to me as far as culture and knowledge, as well as his penetrating religious awareness, is concerned.

We had numerous dialogues about Christianity and Islam. He elucidated to me very well the Islamic doctrine, faith, commands and practices. He was the first ever to introduce to me the treasures of knowledge in the Holy Koran.

- Question: Why have you come to Damascus?

He answered: Perhaps the main cause for my visit to Damascus is that I have decided to carry out historical researches with regard to Oriental Christianity.

But as a matter of fact, when I arrived at Damascus, all my projects and thoughts completely changed.

I was urged forward by a desire to visit holy Islamic points of interest available in Damascus. For example, I was attracted by Omayyid Mosque, which I visited several times. There I lived a thrilling experience and a holy feeling of Godly magnificence in this mosque, where prayers were conducted by Muslims for long centuries.

That impressed me too much. I attempted to express my praise to Glorious God in my own special way.

Moreover, I visited the residence of a great Islamic personality, Sheikh Abdul Qadir Al-Jazairi, for whom I cherish a deep respect for his moral spiritual rightness.

I visited also the tomb of Saladin.

- Question: Did you have a schedule to visit these places when you came to Damascus?

He answered: Never! Initially I thought to visit Patriarch of the orient to discuss with him the problems of the oriental Christians, and to visit a few bishops and archbishops and numerous churches.

I can say that an unknown power was urging me forward strongly to visit holy places in Damascus, which was not in my agenda at all, particularly the last place that I visited; namely, the mosque of Sheikh Mohieddin Bin Arabi, where lies his tomb.

- Question: Could you please tell us about your feelings when you visited the tomb of Sheikh Mohieddin Bin Arabi and his mosque, and by the way have you read his books?

He answered: Yes, I have read the books of Sheikh Mohieddin Bin Arabi; particularly, books translated to French by some Muslims, especially Michel Shotcofix, and also other authors who are brilliant translators and well aware of Islam.

I have found in his books great values, extraordinary spiritual powers, exceptional and convincing force, deep faith, submission to God and evidence of His rightness and authenticity.

As far as my feeling is concerned, when I reached the mosque I tried to pray in the vicinity of his tomb, and stayed for about half an hour pondering and contemplating God, entreating Him to help me not knowing how. Yet I implored His help to give me knowledge, and then I entered the room, where his grave lay.

I do hereby emphasize that I visited the tomb of Sheikh Bin Arabi, because of my high esteem for him. I just wanted to express my appreciation, admiration and exaltation for this spiritual master, although I didn't know why I visit his tomb; nevertheless, I believed that it is the means by which I do express my gratefulness to him for his great works, which I loved so much.

- Question: Hearing your story, it seems that you have lived a lot of skepticism in the course of your life. But during your living experience, have you ever felt some closeness and proximity to God? Or rather have you ever felt His approach and oncoming to you? Or have you ever received any of His gifts or message?

He answered: You mean before my conversion to Islam? Yes, I lived many experiences as far as my faith in God is concerned. However, such experiences do not originate from me, but from Him, since I was hot in pursuit of Him.

Subsequently, when He noticed that I had stepped forward one step towards Him, He stepped forward ten steps towards me. I mean He noticed my genuine pursuit, and that I searched for Him with true and sound heart. Therefore, He overlooked me with care and bestowed upon me His love.

I lived this experience prior to my conversion to Islam: I felt the nearness of God and His continuous protection of me, and I saw manifestations of His supreme powers and Mercy.

But I didn't know then that all this was my first step towards Islam. However now after my adoption of Islam, I understand all these facts and realities.

- Question: Do you have a final word to say?

He answered: In conclusion, I have a word to say to a true seeker of Truth:

Step forward towards God and seek Him with true and sound heart, even if you are desperate; even if you are in doubt and suspicion; and even if you are overwhelmed by worry, concern, anxiety, disturbance and confusion. Be sure God will step forward towards you, manifest to you His Face, and change your heart in order to set up peace and happiness in you, just like me ever since I have adopted Islam.

Roji Garodi adopted Islam and calls for renovation

As promised in the preface of this book, I hereby narrate the story of a French philosopher, who has adopted Islam, and who has appeared in a press interview. This chapter may be considered as a part of the preface.

The interview has appeared in Al-Watan magazine of Oman dated 17/8/2009 and was conducted in Damascus by Wahid Taja, who reports the following:

Roji Garodi, the French philosopher, emphasized that religion should be kept distant from all forms of exploitation and fanaticism, especially political exploitation and intolerance.

He added that western democracy cannot prevent tyranny and dictatorship at all. Hitler was elected democratically by 70 percent of the electorate in one of the most established western democracies.

Roji Garodi, whom we interviewed during his last visit to Damascus, attempted to analyze the causes of religious stupidity and the imitations thereof. He added that those who adhere to such a stupidity are not prone to keep up with modernization. They alienate and estrange any form of religious renovation.

Garodi emphasized that the followers of such a trend are really the problem of Islam, because they look at the future

with the eyes of the past, relying on the interpretations of the clergymen of Omawid and Abbasid eras, which were based on legal problems of that time, and in compliance with the authorities of those ages.

Garodi appealed to the Muslim World to adopt the enlightened thinking of Mohammed Iqbal Lahori, and count on his dynamic approaches to renovation; namely, to avoid reading and understanding Holy Koran with the eyes and mind of the dead past.

Garodi described them as ash eaters, who really benefit the enemies of Islam, by their persisting pursuit to embalm a living Islam.

During the dialogue Garodi spoke about the future of Islam and his visions thereof. He spoke also about the relations of the Islamic World with the western world in what is called a "new global system".

- Question: How do you visualize the future relations between Islam and the West?

He answered: Religion has to be kept distant from any form of exploitation and fanaticism; particularly, the political exploitation.

For example, when we travel to Jewish, Christian or Muslim countries, the first thing stealing our attention is arrogance and domination doctrine.

This authoritative supremacy is either political or religious, quite often religious political mixture, much distant from any form of tolerance, fraternity and goodwill.

For example, Ihod Olmert, the Israeli ex-prime minister has faith in Fair and Just God, who is never oppressive,

never tyrant. Likewise he has faith in Old Testament, which is his guide to this justice and fairness.

But since he is under the influence of the doctrine of religious domination and political supremacy, he envisages the teachings of Just and Fair God, and the instructions and guidance of Old Testament, as something enjoining on him and all the Jews to oust and throw out Palestinians. That is to say, because of his interpretation of Holy Teachings, he is not prone to Kanaanis and is determined to exile and deport them all out of their lands.

This applies to the Catholic Church as well; particularly, that which relates to the present Pope in Vatican. He carries Holy Bible and has faith in the teachings of Jesus inviting us to love, tolerance and purity. At the same time, he obligates himself to a strange odd agreement with US.

A few years ago, I was receiving a prize in Italy for my works. The US ex-president Ronald Regan was in Italy at that time, and he declared to an Italian journalist that there was a written agreement between him and the Pope, whereby Regan as a US president undertakes to fight against communism in Poland, and in return the Pope undertakes to fight against deity that was growing up in South Africa.

Such treaties are signed now between US and Europe and a few so-called "Islamic" countries.

- Question: What is your opinion about the western democracy?

He answered: Democracy means the sovereignty of the nation. Such a democracy never existed as per Jan Jack Roseau, the major adopter of the democratic doctrine, who advocated the French Revolution.

The reason for that is the dissimilar apportionment of wealth, which makes impossible "the formation of the group will".

Another reason is the absence of faith in absolute values, which makes a man love his duties instead of the law of jungle.

One of the discrepancies and disparities existing in the western democracy may be that the declaration of the independence of US of 1776 had asserted that humans are born equal, and that their creator has endowed them with certain inevitable rights, e.g., right of life and right of freedom.

Nevertheless, the US constitution springing from this declaration had retained slavery for approximately one century.

Likewise, the Declaration of Human Rights and Citizenship emanating from French Revolution in 1789 confirms that all humans are born free, should live free, and are equal in rights.

But in articles 14 and 15 of this Declaration there exists a limitation that voting is allowed only to proprietors alone. That is to say, these two articles restricted the voting to proprietors alone.

However, in 1846 the right of voting was extended to all, but only to men. Women who are half the nation were denied the voting.

We have also one typical familiar example of Israel which is given to us as an example and a model for democracy.

Yet in a book called "Jewish character of the state of

Israel", its author Klaud Klin – Director of the Institute of Comparative Law in the Hebrew University of Jerusalem – keeps us aware that the law passed by Kaneesat in 1970 defines a Jew as follows: "Anyone is considered Jew who is born of a Jewish mother, and adopts the Jewish religion, or does not belong to another religion".

It is clear that it is a racial Jewish criterion, which leads us consequently to an era of Spanish Tribunals, which were bound by requirements of blood and conversion to Catholicism.

Democracy in the western way does not prevent tyranny and oppression. Hitler was elected democratically by 70 percent of the electorate in one of the most established democracies of the west.

In US democrats and republicans are not but one party; namely, the party of money, both in pursuit of power.

The basic substantial trick, which justifies all the crimes in the name of democracy, is based on a cultural matching of the market freedom with the human freedom.

- Question: You alluded to new global system and the necessity to face this challenge. How is that possible?

He answered: The phrase "new global system" is not just a normal term. It is a real genuine danger threatening all of us. We must be well aware of these perils, which not only loom over poor countries; but menace also European countries that suffer from their consequences.

As per statistics of the United Nations, more than 80 percent of the sources of international natural wealth are predominated by less than 20 percent. This is a basic index for the economical situation in the world.

Moreover, as per the publications of the UNICEF, it is noted that more than 40 million poor people die every year – majority of them are children – due to hunger or diseases of malnutrition or other diseases which may be cured easily in normal living conditions.

It is worthwhile to mention that the number of poor children dying within two days in the poor countries is equivalent to the number of victims of the atom bomb in Hiroshima.

That is to say, if developed countries continue to develop more, then poor countries have to pay the cost for this development in terms of lives of their children at a rate of 40 million people annually. In fact it is the ugliest face of development ever known by humanity. It is rather a deformed and distorted face of the civilization under "new global system".

What I have mentioned so far relates to poor countries and the countries of the third world. As for Europe and other countries, this takes another direction. George Bush, US ex-president, had said once about the "new global system": "It is a new face of colonialism and imperialism."

But the facts say otherwise. In the old imperialism there were numerous imperialists: English, French, Spanish and Italians. Each colonialist had its peculiar school, and a special distinguished style. But this new face of colonization is represented by one single power all over the world, and the type of this single power is the military power.

In France which is an independent advanced country, not undergoing hunger or malnutrition or diseases, the suffering from "new global system" has another form.

I don't reveal a secret when I say that more than 70 percent of French laws, regulating economy or money or transportation, originate from New York, or dictated from Brussels, and the French government has to accept them, like it or not.

The agriculture sector in France is a shocking example of horrible American intervention. Essential food production increased in France by 16 percent. This increase was not in the benefit of US, which exerted awful pressures on the administrations of common European market.

Consequently, a decree was issued from Brussels - the capital of European Union - ordering France to stop this excess production which has gone too far.

This was confirmed by the summit of eight big industrial states - called Summit 8 - under the American savage threat and quarrelsome persistence.

France was subdued by the clauses of this tyrant decree, and was forced to stop this excess production. At the same time, the majority of the countries undergo sharp deficit in food resources, which conduces to demise of their children.

In very simple terms, it means that France is no more than a colony, and if she tries to liberate herself from this colonialism and imperialism, she cannot do that.

If France wants to be free in her economical laws and decisions, and not to remain a mere colony, she has to take drastic, bold and adventurous measures and very important steps as follows:
1 - She has to refuse the global commercial treaty - known as GAT.
2 - To withdraw from the "Masterkhet" pact.
3 – We as French should stop dealing with international

organizations like the international bank and the international treasury.

But can France do that? I think she cannot.

What I have mentioned so far relates to economical affairs. As for cultural and intellectual affairs, the matter is much more serious.

The best example is the cinema industry. The share for France of the American films is more that 73 percent of its annual films. Whereas the total export of French films to US does not exceed 5 percent annually.

I have appealed to the nation to boycott the American films, and not to pay the TV taxes, if the films of crime and terror in the American way and style continue to appear on the French TV.

- Question: You had published a book called "Islam the religion of future". Do you still believe in it? Do you see the matters go ahead in required direction as written by you?

He answered: Of course, now I have more faith in all that I have said and written, and I insist that all the Muslims should struggle and strive hard, and wield knowledge and awareness, in order to arrive at proper application of Islamic principles.

I don't hide faith inside my pocket, and I don't conceal it in my handkerchief. It is a process of interaction and perseverance. One should not pretend to have reached the termination. You have to strive and struggle daily to reach perfection and beyond, until it is possible to approach a global Islamic civilization, by Will of God, or a global civilization based on Islam.

- Question: How do you envision the future of Islam?

He answered: The problem of the future of Islam may be revealed in simple words as follows:

1 - Either Muslims should look at the future with the eyes of the past, relying on the interpretations relating to the eras of Omawid and Abbasid dynasties, which were based on legal problems of those olden times.

2 - Or they should be able to solve the problem of a new pattern of development, in order that Islam should resume its victorious flight, as happened in the first Hijri century, when the Muslims offered solutions for all the problems, originating from the downfall of Bezentium and Persian empires.

There is nothing more absurd and more contradictory to dynamic global vision than naïve belief that all the past and future problems are solved, and it suffices to memorize the past versions and texts to fulfill all the present requirements, cover all the present developments and answer all the present questions.

Such a sufficiency is contradictory to religion. It prevents thousands of people to delve into the ignorance and disintegration of the collapsing western civilization, see its far-reaching decay and decomposition, and find out that it is possible for the Holy Code of God, who is the Only Possessor, the Only Predominant, the Only Learned, to endow them with all high values, and pull them out from the law of jungle, from the law of power and from the law of mess and anarchy.

On the other hand, if one mixes up this Holy Code of Quintessence with human interpretations of bygone centuries, this would conduce certainly to isolation of Islam.

It is only through the enforcement of the gist of the Holy Code, that Islam can find better opportunities for worldwide spread in this century than what happened in the first Hijri century.

- Question: What do you mean exactly by your appeal for renovation of Islam?

He answered: In my opinion, the renovation of Islam or its future depends on numerous factors, major points of which are the following:
1 – Hot pursuit by Muslims to revise and revive once again all the dimensions, which were made in ancient times, for the sake of magnificent spread of Islam and its glorious global penetration, which was not restricted to traditions and customs prevalent in near east or its past; rather, it was open to all cultures, and acknowledged the great solidarity between monotheistic religions of the east and west and wisdom of remote countries like Persia, India and China.

2 – The great intrinsic dimensions of Islam itself and its love for others. The great Sufis of Andalus, e.g., Bin Masarrah and Bin Arabi, defended the deep-rooted and steadfast values of Islam. Likewise, Birooni and Emperor Akber, during the zenith of Islamic glory in India, defended these supreme values against inherited religious rituals, and external dead frozen religious configurations.

3 – The vast social factors inherent in Islam, repulsing law of jungle, shunning utilitarian quarrels, alienating piled up wealth accumulated in the hands of individuals, and hating misery and wretchedness for other people.

4 – The intrinsic potentials within Islam itself for criticism of clergymen preoccupied with absurdities, who make themselves guardians of fanaticism, and consider themselves representatives of God.

- Question: How do you see some Muslims clinging to the past and fighting against any attempt for renovation?

He answered: The poet Mohammed Iqbal Lahori has proved in his book "Restructure of religious thought in Islam" that positive self-criticism in Islam has preserved Islam from its ailments and sufferings against those who read Holy Koran with the eyes of the dead; that is to say, repetition of what ancestors had said during the first few Hijri centuries, who had their own views and ideas about solving the problems that they had confronted in their own epochs.

But those problems relating to their times are not our problems of our time. Therefore, adopting their interpretations and counting on their solutions is a treachery against Holy Koran itself.

Almighty God who never ceases to create, who has breathed into the human beings from his own SOUL to become His successor on Earth, who invites him without halt and appeals to us without cessation to contemplate His everlasting rejuvenated signs and masterpieces in His perpetual eternal Creation, is taking distance from those people who seek going back to the past.

Such people are eaters of ashes, who by their persistence to embalm the living Islam, offer big benefits to the enemies of the Islamic Doctrine, and who are an obstacle in the face of modernization - not whatsoever on the pattern of western modernization, which is declining, decaying and deteriorating.

Such Muslims prevent and hinder Islam from being on the frontline together with the faithful people of the world, who love future, especially those who love revival of the world.

Where is the legacy of Imam Sadiq?

I was extremely interested in the immense knowledge of Imam Sadiq, and was fond of reading about this great scholar, who overpowered all the scholars, not only of his time, but of all times.

I was particularly amazed by his monotheistic mission in the world, and his capability to debate with the great intellectuals of his age - Muslims or non-Muslims. Whoever has read his debate with his student Jabir Bin Hayyan - known in the west as father of chemistry - feels the loftiness and the grandeur of his monotheistic mission, as if Imam is living in our days and addressing the great scientists of the west.

Almighty God has willed that his student Jabir Bin Hayyan should play the role of the scientists of all ages, and ask Imam very delicate and subtle questions about monotheism and resurrection.

In addition to that, he had posed meticulous and very careful questions with respect to the sciences of his age, e.g., medicine, astronomy, stars, age of cosmos, secrets of soul, secrets of dreams and the secrets of sleep.

He was also asking him very critical questions about the universe, how it has started and how it would end, and the developments and causes thereof.

The responses of Imam to his questions revealed not only

his immense knowledge and his elaborate awareness of very difficult and complex matters of sciences, but rather showed to us his model and his example in the pioneer role of Islam in propagating the monotheistic mission at all times and in all places, which should be followed and patterned by us.

Islam is in fact a religion which addresses the scientists and the great masters of all ages and all epochs. Today, it is addressing the advanced scientific theories with regard to space and cosmos and the explanations thereof.

Imam had forecasted before 1200 years that an era will come when the humanity will have additional senses that didn't exist then.

In those bygone ages humans had five senses only, which Imam said are deficient and inadequate to explore the secrets of the universe. I quote as below what he told Jabir Bin Hayyan during his famous debate with him:

"Tell him that our mind and senses are imperfect and insufficient to comprehend and conceive the tools and instruments by which the world (or life) is created. Nevertheless, we do see with our eyes the materials from which the world is created. In order to apprehend and perceive the tools and instruments by which the world (or life) is made, we must have a mind stronger than what we have now, and senses more than what we have now."[6]

In another place during the debate, Jabir Bin Hayyan asked him:

"Do we expect an era coming in future, when we will be

---

[6] It is clear that X-rays, Gamma-rays, Beta rays, Cosmic rays, Gravitational waves etc. cannot be discerned by **our five senses**; therefore, other senses have to be used to detect them. It is obvious also that **minds stronger than those existing in the olden days** have invented the devices, appliances, tools and instruments that can detect these rays and waves etc.

capable of conceiving the tools and instruments by which the world (or life) was created?"

We quote Imam Sadiq's response as follows:

"Yes Oh Jabir! Science has cycles of rise and fall as emphasized to us by history. It is possible that in future we have scientific boom and progress, when humanity will realize the tools by which the world (or life) is created."

At the present scientific boom and awakening, new senses - or rather extensions to our senses - are invented.

Telescope was invented at the advent of 17th century. The first known practically functioning telescopes were invented in the Netherlands at the beginning of the 17th century. The earliest evidence of working telescopes was the refracting telescopes that appeared in the Netherlands in 1608. Galileo greatly improved upon their designs the following year, i.e., in year 1609.

Ever since there have been many important improvements. In 1668, Isaac Newton built the first practical reflecting telescope, which bears his name, the Newtonian reflector.

The maximum physical size limit for refracting telescopes is about one meter, dictating that most large optical researching telescopes built since the turn of the 20th century have been reflectors. The largest reflecting telescopes currently have objectives larger than 10 meters.

The 20th century also saw the development of telescopes that worked in a wide range of wavelengths from radio to gamma-rays. The first purpose built radio telescope went into operation in 1937. Since then, a tremendous variety of complex astronomical instruments have been developed.

Now we have strong ground telescopes as well as space telescopes orbiting the Earth in space observatories.

In addition to different optical and radio telescopes, there are also telescopes working in a wide range of different electromagnetic waves, particularly infra-red, ultraviolet, X-rays, Gamma- rays etc. There are also Cosmic-ray telescopes, Neutrino telescopes and Gravitational wave telescopes, where there is no image-forming optical system.

X-ray and Gamma-ray telescopes are usually on Earth-orbiting satellites or high flying balloons since the Earth's atmosphere is opaque to this part of the electromagnetic spectrum.

Radio telescopes now utilize a process known as aperture synthesis. As of 2005, the current record array size **is many times the width of the Earth** – utilizing space-based Very Long Baseline Interferometer telescopes.

Radio telescopes are also used to collect microwave radiation, which is used to collect radiation when any visible light is obstructed or faint, such as from quasars. Some radio telescopes are used by programs such as SETI to search for extraterrestrial life.

Aperture synthesis is now also being applied to optical telescopes using optical interferometers (arrays of optical telescopes) and aperture masking interferometer at single reflecting telescopes.

An early microscope was made in 1590 in Netherlands. Ever since there have been very important improvements.

The first detailed account of the interior construction of living tissue based on the use of a microscope did not appear until 1644.

It was not until the 1660s and 1670s that the microscope was used seriously in Italy, Holland and England.

Marcelo Malpighi in Italy began the analysis of biological structures beginning with the lungs.

Robert Hooke's Micrographia had a huge impact, largely because of its impressive illustrations.

The greatest contribution came from Leeuwenhoek, who discovered red blood cells and spermatozoa.

On 9th October 1676, Leeuwenhoek reported the discovery of micro-organisms.

Now we have different strong microscopes, even those which can stare at and look sharply into the interior of atoms, as well as different electron microscopes and those working in many wavelengths of light, ranging from ultraviolet to the visible.

The traditional optical microscope has recently been modified into a digital microscope, where, instead of directly viewing the object, a charge-coupled device (CCD) is used to record the image, which is then displayed on a computer monitor.

Electron microscopes can achieve magnifications of up to one million times, whereas light (optical) microscopes are limited to two thousand times only.

Electron microscopes are used to observe a wide range of biological and inorganic specimens, including microorganisms, cells, large molecules, biopsy samples, metals, and crystals.

In 1939 the first commercial Transmission Electron Microscope was produced by Siemens.

Contemporary electron microscopes are capable of two million-power magnification.

Hardware correction of spherical aberration has allowed the production of images at magnifications above 50 million times.

The ability to determine the positions of atoms, within materials, has made it an important tool for nano-technologies research and development.

Subsequently in 1965 the first commercial Scanning Electron Microscope was invented.

In 1937, the Scanning Electron Microscope was pioneered in Germany.

Both these microscopes facilitated very much the process of sighting living cells at action and the study of their shapes, movements, behavior and divisions.

Yes such strong senses like:

1 - Magnification above 50 million times.
2 - The ability to determine the positions of atoms within materials.
3 - The ability to detect X-rays, Gamma-rays, infra-red, ultra-violet etc. from black holes etc. hundreds of millions light years away.
4 - The ability to listen to sounds coming from black holes etc. hundreds of millions of light years away.
5 - The ability to detect cosmic rays, Neutrino, and gravitational waves.
6 - The ability to collect microwave radiation, which is used to collect radiation when any visible light is obstructed or faint, such as from quasars, more than 12 billion light years away.
7 - The ability to sight living cells at action, and to study

their shapes, movements, behavior and division.

All are really very robust senses, which nobody could think about 1200 years ago, except Imam Sadiq.

Yes, today many tools and instruments are invented, which have given extension to our optical sense, and helped us to sight very remote quasars in the universe, at distances exceeding 12 billion light years.

They have given extension to our audio sense as well, and helped us to listen to sounds springing from remote black holes, hundreds of millions light years away from us.

Extensions to our optical sense have been augmented now to reach the background of the cosmic microwave rays, which was prevalent in the cosmos 380,000 years after Big Bang.

Extension to our optical sense must have gone too far to reach the epoch of (Super Liquid), which was prevalent in the cosmos for about 300,000 years after Big Bang.[7] But unfortunately, this cannot happen, because NASA scientists have declared this epoch as opaque, which will not allow the penetration of electromagnetic waves, including optical waves.

The (Super Liquid) epoch was described elaborately by Imam Ali, 1400 years ago, in his lecture about the creation of the universe, for which we have singled out a special chapter, which will follow in this book.

The optical sight facilities are not restricted to ordinary photographs of these remote quasars, galaxies, stars etc. residing in the far-reaching depths of the universe, but also we have at hand photographs at waves of infra-red, ultra-violet, X-rays, Gamma rays, etc.

---

[7] See a later chapter named: "Imam Ali speaking about Formation of Cosmos".

We have also the facilities to sight very dwindling minuscule particles, which cannot be detected by unaided eye alone - without special microscopes for this peculiar purpose.

The secrets of cosmos lurk in the throne of these astronomical distances, and in the realms of atoms, very minute tiny constituents of atoms and protons thereof, which don't facilitate our unaided five senses alone to see, touch and conceive, because they are deficient, as described by Imam Sadiq.

About 40 years ago, I had read something about Imam Sadiq from a book called, "Genius mind of Shiism" in Persian language. It is a translation from the original French text – a collection of different essays written mostly by more than 20 western academics - and translated to Persian by Zabihallah Mansoori.

I thought at that time that this Great Legacy of Imam Sadiq should be within the Arab Heritage, and preserved in Arabic books, because it is extremely obvious that Imam was speaking Arabic language, and the original text is in fact in this holy, well-established highbred language, and not in European languages.

Now, since I was determined to publish excerpts from this book, I was really stunned to know that this Great Legacy is preserved within European western heritage, and in their books in European languages, and not within the Arab heritage.

Imam Sadiq's Legacy is really the size of elephant! And we, the Arabs, who are supposed to be the original owners and holders of this great legacy, are really the size of fly and mosquito! This great legacy is entrusted to us by our great ancestors, and we were supposed to be worthy of

this trust, and cherish and preserve this great legacy within our heritage throughout the history. But unfortunately, we failed to do so. Instead Europeans took up the task and honestly preserved our great legacy – the legacy of Imam Sadiq.

By the way, if it was not Sharif Al-Razi, who worked hard for 30 years to collect the lectures of Imam Ali from different sources, this great legacy of Imam Ali would have been lost. Nevertheless, there are some from our Intelligentsia who deny Imam Ali this legacy, instead of supporting it with their lives, and defending it with claws and teeth.

I was surprised to know that the Legacy of Imam Sadiq, which should have been the spinal column of Shiite Legacy, and should have been their serious principal concern, is now outside the Shiite Heritage, and outside the Heritage of Muslims at large.

I searched a lot for the original text in the language of the Imam himself – i.e. in fluent elaborate Arabic language – but unfortunately, I didn't find any.

Eventually, I investigated in publishing institutes in Beirut, and after arduous, perseverant inquiries, I was told that the Legacy of Imam Sadiq; particularly, his debates with his student Jabir Bin Hayyan, is preserved in the West and with the western scholars and in European languages, and not in Arabic language!

This means that we don't have at hand the original text of these important debates of Imam Sadiq.

This shows our recklessness and heedlessness for our lofty scientific traditions originating from us, and our concern with cheap, selective traditions.

Here lurk the roots of the downfall of the Islamic civilization in the present era.

During my preoccupation with the search for the Original Arabic Wording of Imam Sadiq, I searched on the internet - which is usually the last resort - and found out some of his Arabic clauses. I initially thought that these are the original wordings. Later, I was shocked to know that they have translated them from the Persian text available with me.

Also on another occasion, I came across the Arabic translation of the Persian book "Genius Mind of Shiites" from a bookshop. I thought I will find the original Arabic text and wordings of Imam himself in this book. I was really frustrated when I read it. I discovered with surprise and sadness the full absence of honesty in translation, and that the translator had the lust and craving to talk himself on behalf of Imam, and not let the Imam speak for himself authentically and genuinely.

I wish he would have quoted excerpts from Imam himself, as any honest man would do, and as the Persian translator, Zabihullah Mansoori himself had done, quoting Jabir what he said and quoting Imam what he said.

That is to say, since the book was an Arabic translation, I could not find in his translation the original clauses from Imam himself, except for few excerpts which relate to selective heritage, belonging to this sect or another, in full support of fossilized minds hot in pursuit of sectarian fanaticism.

It was quite clear to me that they are not concerned about Imam himself and his sayings; rather they want to publish their own ideas on behalf of Imam, and they are not prone to release and propagate the original sayings of Imam.

Since we are inundated by dishonesty and absence of interest in the objectivism of our great legacy; therefore, we have to bow to the West in full respect and esteem, because they have preserved our heritage, and have remained distant from the intrinsic intolerances of the Muslim people, and the fierce wars of fanaticism and bigotry blazing among them.

Here lurk once again the roots of the downfall of the Islamic civilization at present era. We are in a dark tunnel and we don't see any light at the end of the tunnel. We don't anticipate any end to Islamic bigotry, partiality, intolerance and zealotry, and the savage wars thereof.

On the other side, we do see Imam in a transcendent level addressing, with full tolerance, the eminent men, Muslim and non-Muslim, Jewish and Christian scholars, and infidel and atheist distinguished personalities, etc.

Muslims like other religions are involved in sanctifying persons, men and heroes, instead of glorifying truth and rightness.

Such currents started to emerge and surface ever since the demise of the prophet Mohammed. Therefore, Imam Ali was saying:

"Rightness is not cognized through persons. Cognize rightness and truth, and then you will recognize its holders".

We usually show partiality for persons and sanctify them, and sometimes we even almost worship them without feeling it. Whatever they said must be the absolute truth and nobody has right to say anything against it!

Such is humanity ever since the dawn of history. For

example, in Zoroastrianism we see Zoroastrian books brim with praise for Zoroaster, whereas the teachings of Zoroaster himself - contained in his original holy book Avesta - are brimming over with praise and worship of God alone (Ahura Mazda, in their ancient language).

Also, Christianity is centered over the worship of Jesus Christ in their famous triad - Father, Son and Holy Spirit - meaning God, Jesus and the Holy Spirit. Whereas Jesus Christ himself had the holy mission of pure worship of God alone - purified from polytheism.

In Islam, the followers are not called Mohammedians like Zoroastrians and Christians. They must be followers of God alone. Islam literally means "Resignation (to God)". Muslim literally means "Submissive (to God)".

Koran emphasizes quite often that the prophets of God are all Muslim, meaning Submissive to God. It also stresses all the time that all the prophets of God are true messengers of God, and that all of them, including Moses and Jesus Christ, have called their people to worship of God alone.

If polytheism happens to exist in the followers of these prophets, they are not to be blamed for, and it is due to the wrong perceptions of their so-called followers. In spite of all these precautions and high principles, human remains human, and the habitude of humanity is difficult to break.

Therefore, most Muslims also are sanctifying certain persons, and different sects show partialities to certain heroes, whereby the sectarian fierce wars are ablaze, and narrow-minded sectarian differences are widespread ripping Muslims apart.

Unfortunately, nobody is showing interest in absolute truth and rightness. The Persian poet Hafiz Shirazi has said:

"Wars ablaze between 72 sects, you do pardon them all.
Since they have not sighted Truth and Rightness,
They are preoccupied with stories."

Yes, **Truth should be sighted**; otherwise, humans are swept away by endless stories. What is more stunning and strange is that every sect thinks that their respective stories represent their religious belief.

Therefore, it is imperative that Truth and Rightness has to be witnessed, sighted and cognized by one's Initiation, as Imam Ali has said: "Cognize Truth".

The problem with the people and their scholars as well, is that they restrict knowledge to mental recognition and don't take the Pure Initiation into consideration. They think knowledge is acquired by reading a book or listening to a lecture. In short, they think it is a process of data collection, unaware of the fact that such processes can be undertaken in a better way by tape recorders or computers, and we don't call tape recorders or computers "Learned Creatures".

In reality, the process of cognition of Truth and Rightness is practical under a perfect model called Teacher, Master, Sheikh, Peer or Guru (depending on the language used), whereby Pure Initiation comes back to life, under his supervision.

Initiation is related to Soul, and is not an intellectual process. It has nothing to do whatsoever with mind or mental activity. The seeker of Truth or lover of God has to follow the example of his master, and copy and imitate him, or in words of Holy Koran to follow him, as per the Holy Verse of Koran 3.31:

"If ye do love God, follow me: God will love you and forgive you your sins: for God is Oft-Forgiving, Most Merciful".

Is not Koran clear in what it says? Is not Koran fluent and eloquent? It works only with those who love God (love Truth) and seek Him (seek Truth), and who has the capability to follow.

Most of us are not true seekers of God; and if we happen to be true seekers of God, it is very much difficult for most of us to follow and succumb to the Master of Divine Teachings. Our chronic disease is that we think that we know. We are sticking badly to our ego and selfishness. The first step to true knowledge is to throw away your ego.

If we delve into our sectarian differences, we find that each sect narrates a certain story. They have actually differed in the stories - which we call history - and all 72 sects have relinquished Truth and Rightness, and they are no more interested in it.

If we tell them that Truth is cognizable by virtue of Initiation and is not mentally recognizable through persons and that first you have to cognize Truth independently, and then you will recognize holders of Truth, they would smile at us - an indication that they know better than anybody else - and would then start narrating stories of certain icons of history.

I was hot in pursuit of the style of Imam Sadiq in debating with the scholars - Muslim and non-Muslim, Jewish and Christian, infidel and atheist, etc., and I told myself if the religion of Islam is so magnificent and glorious, and has such dynamic potential of reason and pragmatism, it would never fail to confront the high ranking scientists of our days, and offer to them suitable pragmatic solutions to their problems.

I do know for sure that Muslims don't exceed one quarter of total population of Earth, and that majority consists of Christians, Hindus, Budhists, etc.

I saw in the debate of Imam Sadiq with his student Jabir Bin Hayyan (called father of chemistry in the west), that Jabir asked him how to explain the subject-matter of (His Command: "BE", and it is!) to non-Muslims as per Koran (Sura Yaseen) 36.82:

Verily, when He intends a thing, His Command is, "BE", and it is!

Then Imam gave him adequate explanation of the monotheistic doctrine, from point of view of wisdom, which is acceptable to all wise people of the world. Hereunder, we quote a portion of the dialogue:

Jabir – I do understand what is meant by His Command: "BE" and it is! Since I am Muslim I know that Almighty God willed the world to emerge to existence and it emerged. But I want to conceive this meaning from point of view of wisdom, in order to prepare myself to explain it to a non-Muslim individual, who may deny it, so that I can convince him from point of view of wisdom.

Imam – To answer to your question, from point of view of wisdom, it is inevitable to speak first about Will, which is prevalent throughout the Existence beyond any doubt.

If my listener is monotheist, I would tell him that Will is a firm durable attribute of God, relating to His Identity, since attributes of Almighty are not separable from His Identity. In Humans, our attributes are detachable from us. A man is not born learned, and knowledge dissociates itself from his identity.

Man is not born learned, and knowledge is separable from his identity. It is inescapable that he should acquire knowledge for a long time until he becomes learned. Then the feature of knowledge becomes part of his identity, after he was deprived of it.

Any craftsman is not born so. Craft is not part of his identity. It is unavoidable that he should spend a long time to learn a certain craft from an instructor, and then practice it under his supervision until he gains mastery of it. Only then the quality and feature of such a craft is affiliated with him.

As for Almighty God, all His attributes and characters are not separable from His Identity. He is Omniscient and Omnipotent from Eternity, His knowledge is not detachable from His Identity. Nothing increases to His Identity, and nothing decreases from His Identity. His Potency emanates from His Knowledge, and His Knowledge and His Potency are not separable from His Identity.

If my listener happens to be the infidel and the atheist, who does not believe in monotheism, he would not accept these facts. More stunning is the fact that he believes in his idol and the potency of his idol, but he believes not in the knowledge and potency of Almighty God.

He knows well that the idol that he has made with his own hands does not possess potency, and that eventually he is worshipping something else other than the idol, as you well know.

I do tell the infidel and the atheist, who does not believe in Almighty God, that Will is existent by itself. If he objects saying that Will does not exist by itself and that it is dependent on our existence, and if we would not exist, Will would not be existent also, I do tell him that Will is existing, we be or not.

As per the principle of wisdom, which is acceptable to all wise men in the world, anything that exists does not perish, but its form is transformed. If he says that Will perishes after our death, I would give him an example:

Same are our Birth and Death, because they are two faces of Life. Birth does not deny the Death. Likewise, Death does not deny the Birth. If we assume Birth and Death to be two poles of a rod, then rod may be assumed as Life, and Birth and Death as its two poles.

The monotheist does not fear death, because he knows that he stays alive after death. If the atheist comes to know that death is another face of life, he would never fear death.

Therefore, try to convince the atheist who has no faith in God that he is surviving after death.

Jabir – If an atheist asks me by what materials and tools Will had created this life? How to respond to him?

Imam – "Tell him that our mind and senses are imperfect and insufficient to comprehend and conceive the tools and instruments by which the world (or life) is created. Nevertheless, we do see with our eyes the materials from which the world is created. In order to apprehend and perceive the tools and instruments by which the world (or life) is made, **we must have a mind stronger than what we have now, and senses more than what we have now."**

You well know there are individuals among us who cannot smell any odor: neither perfume nor bad smell, because they are lacking the sense by which the odors are smelled. You well know also that there are individuals among us who cannot see anything, because they are lacking the sense by which the things and persons are seen.

As far as comprehension of tools is concerned, by which the world (or life) is created, we are just like them, who lack some senses, smell not any odor and see not anything. **In order to conceive them we need a stronger mind and require senses more than what we have.**

Jabir - Do we expect an era coming in future, when we will be capable of conceiving the tools and instruments by which the world (or life) was created?"

Imam - Yes, Oh! Jabir. Science has cycles of rise and fall as emphasized to us by history. It is possible that in future we have scientific boom and progress, when humanity will realize the tools by which the world (or life) is created."

End of dialogue

Since I am a diligent hardworking student of these eminent superb men; therefore, I intended to read the above dialogue in its original language - language of the Imam himself - i.e. in eloquent fluent Arabic language.

I searched and investigated everywhere in the books in local libraries as well as the publishing houses abroad, but I could not find any. **Ultimately, after all these industrious investigations, the final outcome was that this Great Legacy is preserved in the west and in European languages, and is not preserved with us, in its original language, i.e. in Arabic language.**

I will mention in later chapters[8] of this book other important excerpts and extracts from the dialogue of Imam Sadiq with Jabir Bin Hayyan about the doctrine of Hereafter or life after death and about the secrets of Soul and Sleep, but from point of view of wisdom, which is acceptable to all the wise men of the world.

[8] In the three later chapters:

1 – Greek scientists: How they worried and feared death?

2 – Fear from Death has no sense in Islam.

3 – Soul from point of view of Islam.

Same are our Birth and Death, because they are two faces of Life. Birth does not deny the Death. Likewise, Death does not deny the Birth. If we assume Birth and Death to be two poles of a rod, then rod may be assumed as Life, and Birth and Death as its two poles.

The monotheist does not fear death, because he knows that he stays alive after death. If the atheist comes to know that death is another face of life, he would never fear death.

Therefore, try to convince the atheist who has no faith in God that he is surviving after death.

Jabir – If an atheist asks me by what materials and tools Will had created this life? How to respond to him?

Imam – "Tell him that our mind and senses are imperfect and insufficient to comprehend and conceive the tools and instruments by which the world (or life) is created. Nevertheless, we do see with our eyes the materials from which the world is created. In order to apprehend and perceive the tools and instruments by which the world (or life) is made, **we must have a mind stronger than what we have now, and senses more than what we have now."**

You well know there are individuals among us who cannot smell any odor: neither perfume nor bad smell, because they are lacking the sense by which the odors are smelled. You well know also that there are individuals among us who cannot see anything, because they are lacking the sense by which the things and persons are seen.

As far as comprehension of tools is concerned, by which the world (or life) is created, we are just like them, who lack some senses, smell not any odor and see not anything. **In order to conceive them we need a stronger mind and require senses more than what we have.**

Jabir – Do we expect an era coming in future, when we will be capable of conceiving the tools and instruments by which the world (or life) was created?"

Imam – Yes, Oh! Jabir. Science has cycles of rise and fall as emphasized to us by history. It is possible that in future we have scientific boom and progress, when humanity will realize the tools by which the world (or life) is created."

End of dialogue

Since I am a diligent hardworking student of these eminent superb men; therefore, I intended to read the above dialogue in its original language – language of the Imam himself - i.e. in eloquent fluent Arabic language.

I searched and investigated everywhere in the books in local libraries as well as the publishing houses abroad, but I could not find any. **Ultimately, after all these industrious investigations, the final outcome was that this Great Legacy is preserved in the west and in European languages, and is not preserved with us, in its original language, i.e. in Arabic language.**

I will mention in later chapters[8] of this book other important excerpts and extracts from the dialogue of Imam Sadiq with Jabir Bin Hayyan about the doctrine of Hereafter or life after death and about the secrets of Soul and Sleep, but from point of view of wisdom, which is acceptable to all the wise men of the world.

---

[8] In the three later chapters:
1 – Greek scientists: How they worried and feared death?
2 – Fear from Death has no sense in Islam.
3 – Soul from point of view of Islam.

Terrestrial Globe as one living entity

The Will had intended to create its visual, sensible and tangible manifestation, so there was this phenomenon brimming over with all its living and evolving constituents, elements and creatures, which configure this living entity called "Terrestrial Globe".

There is no difference between this living entity which is visual, tangible, concrete and material and the Will that had created it, except for the fact that Will is its quintessence, and that humans see not the Will nor sense it nor feel it nor touch it, whereas they see terrestrial globe, which is visual and sensible, and sense it, feel it and touch it.

In reality, the Will had created Life or a living entity called "Terrestrial Globe".

Ever since the advent of the second half of the 20th century modern science had been able to make and manufacture space satellites penetrating terrestrial atmosphere and overcoming gravitation.

They were launched and set to orbit the Earth, moon and some other planets. Some space ships still continue orbiting the Earth. Some had reached the moon, wherefrom the astronauts had landed upon the moon. Some had reached Mars and lodged robotic vehicles over there to photograph Mars and what exists on its surface. Some had reached Mercury, Venus, Jupiter, Saturn etc., and go on orbiting them and performing certain scientific tasks.

During the last six decades many space ships had been launched and set to their orbit around the Earth. Also, space stations had been set to their orbit around the Earth; namely, the Russian Mir, which had already expired, and then the international space station (ISS) which continues to orbit the Earth.

Most of these space satellites have been orbiting the Earth for the last 40-50 years. Some of these space ships had carried astronauts, who were performing certain scientific assignments, simultaneously watching and observing the terrestrial globe from those lofty heights. They were also photographing it. Ever since, the beautiful photos of our wonderful Earth became well-known, widespread and commonplace among the people.

Some even had carried space tourists who had paid about 20 million dollars or more per head for their space journey.

On April 24,1990, Hubble telescope was launched and set to orbit around the Earth at 593 kilometers above sea level. It was named as a tribute to the famous American astronomer Edwin Hubble, the discoverer of cosmic expansion theory.

It started photographing stars and galaxies, and continues to do so since then. Its super telescope went so deep into space and stunned the world with astounding photographs of super galaxies called quasars, at distances more than 12 billion light years.

That is to say, these photographs relate to times more than 12 billion years ago, since the light of these galaxies has traveled so long time - more than 12 billion years - until it has reached us today - light travels at about 300,000 kilometers per second.

Before it the Hubble cameras have photographed the exploding superstars, which had completed their normal life cycles and exploded, amidst huge colossal clouds, which had later subsided and faded away leaving a single point called (SINGULARITY), where most of the density of the superstar is centered, marking the beginning of the formation of a black hole.

Hubble will be replaced in 2014 by another space telescope called (James Webb), named after a former NASA administrator.

James Webb space telescope (JWST) is a large, infrared-optimized space telescope, scheduled for launch in 2014. JWST will find the first galaxies that formed in the early Universe, connecting the Big Bang to our own Milky Way Galaxy. JWST instruments will be designed to work primarily in the infrared range of the electromagnetic spectrum, with some capability in the visible range. JWST will reside in an orbit about 1.5 million kilometers from the Earth.

There are other super space telescopes which were launched in the nineties of the 20th century.

One example is Chandra space observatory – named in honor of the Indian-American physicist Subrahmanyan Chandrasekhar who is known for determining the maximum mass for white dwarfs – which is photographing X-rays and Gamma-rays in the depths of the universe. It is launched on July 23, 1999, and is 580 kilometers above the Earth.

Chandra is sensitive to X-ray sources 100 times fainter than any previous X-ray telescope, due primarily to the high angular resolution of the Chandra mirrors. Since the Earth's atmosphere absorbs the vast majority of X-rays, they

are not detectable from Earth-based telescopes, requiring a space-based telescope to make these observations.

On July 24, 2008, the International X-Ray Observatory, a joint project between ESA, NASA, and JAXA, was proposed as the next major X-ray observatory. Its expected launch date is 2020.

Another example is XMM-Newton space observatory – named in honor of Sir Isaac Newton, the famous English discoverer of gravity law – which photographs X-rays in these immense depths of the cosmos. It is an orbiting X-ray observatory, launched on December 10, 1999, at elliptical orbit by ESA – European Space Agency. At its apogee, it is nearly 114,000 kilometers above Earth, while the perigee is only 7,000 kilometers.

These two are in fact space observatories, and they have discovered what Hubble could not discover, since Hubble photographs ordinary light rays only.

They have discovered what our eyes cannot see, although they exist, like X-rays and Gamma-rays, which have developed from matter fleeing from the gravity of black holes, around which they orbit at enormous velocities nearing the speed of light.

The gravity of black holes is so gigantic that even light cannot escape from them. Therefore, we cannot see light over there; namely, we cannot see anything there, although they exist. Therefore, they are called "black holes".

On March 25, 2000, NASA launched a satellite called IMAGE, provided with an apparatus called HENA (closer to MIMI technology used in photographing the Jupiter's magnetosphere). IMAGE obtained the first global image of the Earth's magnetosphere, the shell of positively charged

ions and negatively charged electrons that lies atop our atmosphere and extends far out into space.

Shortly we will see with our own eyes the magnetosphere of our Earth – as we had seen before the magnetosphere of Jupiter – in the sense that we will see its shape, pattern of movements, contractions, expansions, dynamics, elements and chemical compounds, whereby science will be better equipped to monitor Earth's space weather, and be able to improve weather forecasts that will give advance warning of electromagnetic storms, cyclones and tornados, which in the past have disrupted the electronic communications and crippled even electrical power grids, i.e., electric energy distribution networks on Earth.

Photographs had been taken of the secret mechanism of terrestrial magnetic field, including tail of the electrified gas. This tail is directed from Earth to Sun, and consists of PLASMA or transparent electrified gases.

Thanks to satellites, there will be endless data at the disposal of the scientists, in the near future, which will enable them to detect the outer space near the Earth in three dimensions, and acquire new horizons of knowledge and understanding of the interactions existing between Earth and Sun.

A NASA news release of January 26, 2001, under the headline "NASA's IMAGE Reveals Earth's Invisible Magnetic Tail" stated that:

(The first large-scale pictures of the hidden machinations of the Earth's magnetic force-field are now available, including confirmation of suspected, but previously invisible "tail" of electrified gas.

The tail, which streams from Earth towards the Sun, was

spotted by NASA's Imager for Magnetopause to Aurora Global Exploration (IMAGE) spacecraft and is featured on the cover of the January 26 issue of the Science journal. The new imaging technology offers unprecedented views of the transparent, electrified gas trapped within Earth's magnetic field, providing the first visual, global perspective on magnetic storms.

The region laced by Earth's magnetic field, called the magnetosphere, dominates the behavior of electrically charged particles in space near Earth and shields the planet from the solar wind. Explosive events on the Sun can charge the magnetosphere with energy, generating magnetic storms that occasionally affect satellites, communications and power systems.

It's difficult for any one spacecraft, or even a small fleet, to obtain a coherent, large-scale view of activity in this vast region because the magnetosphere extends beyond the Moon on the night side of the Earth.

"Imagine trying to track and understand the formation of hurricanes without the view from weather satellites," said Dr. Thomas Moore, IMAGE Project Scientist at NASA's Goddard Space Flight Center, Greenbelt, MD. "Like the first meteorologists with a small number of measuring stations, we had an incomplete and at times misleading view of the magnetosphere and magnetic storms before IMAGE, because we couldn't see the big picture."

"IMAGE is providing for the first time global views of the Earth's charged-particle populations at multiple wavelengths and energies on time scales of a few minutes, which is sufficient to track the dynamics of the magnetosphere," said Dr. James Burch, IMAGE Principal Investigator and lead author of the Science paper at Southwest Research Institute, San Antonio, TX.

The Earth's magnetosphere traps electrified gas, called plasma. The new IMAGE pictures show a tail-like structure in the Earth's own plasma cloud that forms as some of the gas streams toward the Sun. The structure was predicted 30 years ago, but previous spacecraft were unable to confirm its existence.

The tail structure is believed to be a return flow of plasma that occurs when the solar wind (a plasma flow ejected continuously from the solar surface) buffets the magnetosphere and distorts its shape.

For example, at first a falling raindrop is roughly spherical. As it falls and gains speed, air resistance causes the droplet to change shape as water is dragged from the bottom (head) to the top (tail). Surface tension prevents most of the water from simply dispersing from the tail, so it is forced to flow within the raindrop and return to the head.

The solar wind distorts the Earth's magnetosphere in a similar way, compressing it on the Earth's day side, like the head of a raindrop. The region is stretched on the night side, like the raindrop tail, forming a teardrop shape.

Plasma near the boundaries of the magnetosphere is dragged with the solar wind, but then is turned around and forced back towards the Sun, moving around the Earth in tail-like flows. Although the plasma tails were expected, IMAGE discovered areas in Earth's plasma cloud that are nearly empty of plasma. The IMAGE team calls these unexpected structures "troughs" and is trying to discover how they form.

IMAGE, launched March 25, 2000, also revealed some surprising activity during magnetic storms, which occur when the solar wind pummels the Earth's magnetosphere, stretching it out on the night side. The night-side region of

the magnetosphere suddenly snaps back and shoots plasma violently toward Earth. The plasma becomes heated to several hundred million degrees and whirls around Earth in multi-million-amp currents. IMAGE discovered the hot storm-plasma occasionally is most dense on the Earth's day side, which is unexpected. Researchers are currently studying this.)

After IMAGE came the European Cluster to explore the magnetosphere – the region of space dominated by Earth's magnetic field.

Hereunder are few excerpts from European Space Agency Science Report dated February 3, 2001:

(For the next two years, four identical spacecraft will be returning simultaneous observations as they follow highly elliptical polar orbits around the Earth. The stream of data sent back by Cluster will enable scientists to obtain their first detailed, three-dimensional view of near-Earth space.

"I am confident that this exciting mission will provide two years of ground-breaking data which will cast new light on our understanding of the interaction between the Sun and Earth," said the ESA Science Director, Professor Roger Bonnet.

"Now that Cluster has cleared this final hurdle with flying colors, some 250 physicists around the world are looking forward to analyzing the flood of scientific data from the instruments on board the four spacecraft."

"Everyone is eagerly anticipating a scientific bonanza from Cluster in the months and years to come," said Project Scientist Philippe Escoubet.)

After all this scanning and close examination and survey

it was found that our Earth was the most beautiful and splendid planet throughout the solar system and without, compared to other planets and stars.

The marvelous and superb scenery of our Earth was charming the astronauts, making our planet most exquisite and gorgeous in their eyes, and increasing their yearning and nostalgia to Mother Earth.

They were deploring the human population of our Earth, because they don't appreciate and admire the precious and dazzling gem on which they live. They kill each other and annihilate millions of themselves, as happened in the first and second World Wars.

They were lamenting the human population because they don't pay any attention to their lovely planet, exploit its resources very badly, pollute its air recklessly, and contaminate its atmosphere in an ugly way, in order to satiate their selfish attitudes and secure their material benefits.

They were deploring the greed and avarice of the human population and their materialistic behavior, which lacks morals and moralities.

They have expanded industries for their own benefits, whereas their morals have been dwarfed. As a result, they have contaminated the natural environment and damaged the atmosphere, by disseminating poisonous gases into the air and causing cracks in the ozone stratum.

What intensified the matter and made it worse is the fact that these poisonous gases, including carbon dioxide, have caused the Earth temperature to augment, precipitating the melting of ice in the two poles of the Earth, and posing the danger of swelling of seas and oceans, which may

deluge many islands and coastal resorts of the Earth.

Since then there emerged a group of astronauts, who had looked closely at our Earth from those lofty heights, and noticed the magnificence of this living entity (our lovely planet) and its beauty and charm; thenceforth, they propagated a theory called the Gaya Theory.

This theory emanated from this group; henceforward, developed and spread in the scientific circles, and it may be propounded as follows:

The terrestrial globe is a living entity throbbing with life. All the global creatures – humans, animals, plants, fluids, solids and inanimate bodies, organic and inorganic entities, in gaseous or in liquid states etc. - interact with each other, evolve and grow together, integrate and complement each other, in order to sum up to one final entity; namely, the splendid, marvelous and magnificent Earth, so that it may continue as one living entity pulsating with life.

Each of these species, e.g., humans, animals, plants appears to be independent, but it is not so, exactly like each cell or a group of cells in a human body appears to be independent, but it is not so.

Each entity is performing its functional role in the body of the living Earth – exactly as do the cells in the body of a living human – to facilitate the Earth to continue as a living entity throbbing with life, and to remain alive within the solar system, orbiting the Sun for billions of years.

These global creatures in the body of this living entity (Earth) are like billions of cells in the body of a living human. Although each cell is a living entity and appears to be independent; nevertheless, all the cells co-operate together to facilitate the final summation (the human) to

continue as a living human until the appointed time of his demise.

The balanced setup of terrestrial creatures constitutes the basic element of the life of Earth. Therefore, any disorder in this balanced setup is followed, sooner or later, by phenomena called vengeance of nature, like the well-known NINO and ELNINO, which the mankind go on suffering from ever since the seventies of the 20th century, and also the up-growth of skin diseases in the regions where ozone has shown cracks.

Most dangerous phenomena that have so far emerged are the soaring of temperatures in the oceans and on Earth, and consequently the disequilibrium in the hot and cold currents inside the depths of oceans, and swelling of seas and oceans, which may be followed by disappearance of many inhabited beautiful islands and fascinating coastal resorts, which are inhabited as well.

According to the Gaya Theory, it is imperative to preserve the global equilibrium or the so-called environment, so that our planet remains the most exquisite and splendid planet in the whole solar system, and without, with all its charming and dazzling colors.

If the mankind is going to exploit the power of modern science to satiate his arrogance and tyrannical whims, then this living entity (Earth) is going to manifest harsh repercussions, and display to us its ugly grim face of vengeance and punishment.

The unnatural phenomena known as vengeance of nature – NINO, ELNINO, melting of ice in the two poles, swelling of seas and oceans, erosion of mainland in some regions of the world, etc., have surfaced for the last few years only, when the humanity began to exploit the nature excessively

for his own benefits, and cause in the shrinkage of forests and extinction of some animal and bird species.

He has gone too far into industrial activities, and exceeded the limits in cost reduction, a fact which has caused outrageous amounts of harmful poisonous gases, that have resulted in cracks in the stratum of ozone in some regions; particularly, at the poles and areas close to them, and in the phenomena of ice melting, puffing-up of seas and oceans, and potential disappearance of vast areas of mainland.

If the humanity does not stop his outrageous exploitation of nature for his own material benefits, and his excessive pursuit of transgression and abusive force, the so-called vengeance of nature would never stop, and the ultimate loser would be of course the man himself.

Earth may have patience for a decade or two, or perhaps little more, but it will not have patience for ever, and it will certainly display repercussion against this tyrant, aggressive, modern man.

All this marvelous superb beauty of this globe is due to this environmental equilibrium, or the balancing of global creatures, without any excessive aggressive intervention of some species against others.

The Gaya Theory goes on confirming that terrestrial globe is one living entity, although there appear different varieties of species living on the Earth, e.g., humans, animals, plants, solids, fluids, gases, etc., and that all these creatures are complementary to each other, despite apparent variation.

Gaya Theory asserts the fact that all these creatures should co-live together in tranquil harmony since all are in need

of each other. If any species is wiped out or somehow impaired, it will have negative bearing on other species.

As billions of cells in the human body act in an amazing system and in superfine concert, to facilitate a living human to remain sound and healthy, so do the global creatures to enable the living Earth to remain sound and healthy, throbbing with young life and pulsating with vigor and activity.

Any disorder in environmental system and terrestrial equilibrium causes strong reactions from Earth. This conflict is causing ailments and infirmities in the body of Earth, which may conduce eventually to extinction of species, including the human species.

In reality, these varieties of species are similar to billions of living cells in the human body, which live in full harmony, although they are different from each other, and eventually they constitute one another living entity – Human.

They are also similar to billions of living cells in the animal body, which live in full accord, although they are different from each other, and finally they shape one another living entity – Animal.

They are also similar to millions of living cells in the plants, and millions of living molecules and atoms in solids, which also eventually make one another living entity – Plants or Solids.

Life and kinetic energy creep into Solids also, since they are ultimately formed, in their atomic structure, from electrons orbiting at immense speeds the nucleus which is made of protons.

Also life pervades the water in the rivers, lakes, seas,

oceans and also the ice - the solid state of water - in the two poles or at the peaks of mountains, and also steam - the gaseous state of water - which spreads throughout the atmosphere in the shape of clouds.

The Gaya Theory stresses in its underlining recommendations to humans, who are preoccupied with a life of lavish and luxury, greediness and avarice, to conserve and take utmost care of plants and vegetation, greenwoods and green forests, which shape most of the Earth.

If anything of it is wiped away, the terrestrial equilibrium is impaired, by augmentation of carbon dioxide, scarcity of rain, shrinkage of oxygen, pollution of air, etc., all having negative impact on human life.

The green life is also rich in medical herbage, which is extremely beneficial to humanity and healing of his ailments and diseases. That is to say, the living entity Earth has the potential to cure itself by itself – by herbage and other elements which are part of Earth.

The Gaya Theory focuses in its recommendations on the preservation of various species – animals, birds – of which few species have gone extinct due to human transgression.

Human has become enemy of his own environment, and has wiped out much of greenwoods and much of green areas from most of the world Atlas.

But the vengeance of nature will certainly restore to him his sanity, and force him to be deterred from his sins and temptations, and from his tyranny and oppression, and compel him to change his pattern of life, so that to harmonize completely with his own healthy inborn nature and the sound human civilization – harbingers of the

impending glad tidings and good omens that we hope would come true in this very century.

We could also deduce from the Gaya Theory that the plant life which covers most of the Earth surface, especially the medical herbage, has the potential to change the gleaming lines, wrinkles and curves in the Human Magnetic Double Ether (Human Halo), and affect it positively, and remedy human ailments and diseases.

That is to say, the living entity (Earth) can cure itself by itself – by the herbage and elements which are part of the Earth itself.

We do expect hopefully a day in which a new page would open in the medical history, and the medication would have a happy turn, doing away with cutting of flesh, abdomen, organ, etc., which have lots of negative side effects.

That day looks impending, when man will have favorable leaps to illuminated colors of Human Halo instead of handling the weak fragile human body.

Human being
as one living entity

The Will had intended to create its visual, sensible and tangible manifestation, so there was this phenomenon brimming over with all its living and evolving constituents, elements and creatures, which configure this living entity called "Human being".

There is no difference between this living entity who is visual, tangible, concrete and material and the Will that had created him, except for the fact that Will is his quintessence, and that humans see not the Will nor sense it nor feel it nor touch it, whereas they see human beings, who are visual and sensible, and sense them, feel them and touch them.

In reality, the Will had created Life or a living entity called "Human being".

My Great Master Sheikh Sadiq Anqa had written many books about self-cognition (IRFAN) from scientific standpoint. He had mentioned in the context thereof, in elaborate detail, about the Human Etheric Magnetic Halo, or so-called (Ether Double), whereon was the focus of the prophets, saints and men of God.

His teachings overflowed to his disciples, whom he educated and taught self-cognition (IRFAN), whom he raised and reared in transcendentalism, whom he fostered and nursed in detachment from the heavy over loadings of body and matter to the tender delicacies of Soul and

Spirit – the selfsame teachings that were propagated by prophets and saints to their disciples.

His epoch was contemporary to the booming era of the modern science, which started progressing by leaps and bounds after the Second World War.

Therefore, Sheikh Sadiq Anqa was addressing the world in its modern language, as did before the prophets and saints, who addressed their people in their own language, appropriate to their mentality and way of thinking.

For example, his valuable book "Hidden angles of life" was primarily addressed to the "International Institute for Different Scientific Researches" located at Washington D.C., in year 1975, as a comprehensive response to 16 questions posed by the institute about difficult topics that science could not solve until then.

In his book, he encouraged the scientific society to follow the right track in their researches, in order to be in a position to access the secret of life by scientific methods, since the ultimate goal of science is to access the absolute truth of life.

In page 67 of the book he mentions the following:

"The cell is under the influence of unknown factors of rays and magnetic forces from within and without. Therefore, the study of the cell itself, while overlooking these influential forces and energies, will not lead us to perfect discovery.

I wish I could have convinced the scientific societies before that the gateway to success of scientific researches is to investigate about individual and social magnetic forces interacting with the human cells, and their direct and indirect connections with all other forces of Existence.

If the scientific research in the organic side of the human cell could have been simultaneously coordinated with scientific research in human magnetic entity - under precise microscopes - the results would have shown us the True Life in Action.

I am confident that such a day is not that remote. Such an electromagnetic entity is one layer within many layers separating our heavy material body from our Absolute Soul.

Our awareness with such an entity, through scientific researches and experimental methods, will certainly become easy gradually, and will provide us with the criteria for cognizance of other layers, which are more tender, fine and delicate".

It appears that the scientific circles have listened well to his advises. "The international institute for different scientific researches" located at Washington D.C. has its own special methods to convey such important messages to scientific societies.

Dr. Ronald Kryzul, who was president of this institute at that time, became disciple of the Great Master Sadiq Anqa, and was under his training for telepathy.

The best evidence showing that the scientific society has listened well to the advice of the Great Master Sadiq Anqa, is the modern science's new tendencies, whereby the science has begun to study and research about the magnetospheres of Jupiter and Earth.

At the end of year 2000 science could photograph, for the first time in science history, the magnetosphere of Jupiter. It is now hot in pursuit of completing the total photographing of Earth's magnetosphere, as already

mentioned, which when consummated can facilitate providing us with long-term atmospheric forecasts.

These giant accomplishments necessitate very large and huge budgets that are spent for space science, in order to discover astounding facts about the wonderland of cosmos.

Science has already begun new types of research, and has achieved scientific developments with regard to the human cells and their capability to sight infrared waves.

It has also proved that a cell has two eyes, brain, nervous network, digestive system, station for energy supply, and most important that it is capable of information management operations.[9]

Of course, this is just a start, and what science has so far discovered is no more than a drop of water from the vast expansive ocean.

We do expect from science in the near future a comprehensive study of organic side of cells, in full and simultaneous coordination with other scientific studies of magnetic forces, cosmic rays and other forces and energies of Existence, which have bearing on the living cells, and with which the living cells interact.

Of course such gigantic superhuman project requires very precise and advanced tools and instruments to detect magnetic forces, cosmic rays and other forces and energies in cosmos, in addition to strong microscopes and very special advanced cameras to photograph them.

We do expect all these, until eventually we are provided with scientific experimental criteria to conceive the tender

---

[9] Please refer to my book: "What is the secret of life?"

and delicate layers, which separate this material human from his Absolute Soul.

It is uncommon to compare the living terrestrial globe to living human body. As there are thousands of thousands of living humans on Earth, so there are thousands of thousands of living cells in the human brain, each having a life cycle of 25 years or so, exceeding the life cycles of other groups of cells in other parts of the body, which vacillate from seconds and minutes, as in the case of cell groups of skin, to ages less than that of the brain, so that the average life cycle of the cells is 13 years.

Likewise, as there are "groups" in the cells, so there are "species" on Earth.

How conspicuous is the resemblance of a group of brain cells to the human species!

As the human species has characteristic advantage over other species on Earth, so is the group of brain cells, which has advantage over other groups of cells in other parts of the body, as far as life cycle is concerned, and also in important functional tasks of mind, intelligence, management, long-term planning, etc.

As other species are at the disposal of human beings benefiting from them as and when required, so are the parts of the body at the disposal of brain benefiting from them as and when required.

As the human being is managing and commanding other species, in order to satiate his needs of food, accommodation, work, reproduction, entertainment, etc., so is the brain, which is the main station of the nervous system, having management and commanding advantage over other parts of the body.

Man is consuming animal flesh for his food and energy, animal skin for his clothing, décor and luxury purposes, vegetation for his food, medication and accommodation-since trees contain wood.

Many of the functional organs like lever, kidneys, spleen, lungs purify the blood from its waste, and feed the brain with pure blood, rich in energy elements.

Veins and arteries are there to facilitate blood circulation and its continuous flow, running day and night without stoppage, conveying pleasant and palatable food for the brain – knowing that arteries and pulsating veins have huge length of about four times the circumference of Earth.

The only absolute benefactor in the human body is the heart, which not only feeds all the parts of the body, including brain, with blood, but also feeds itself.

When comparing the brain in the human body to the human species on the terrestrial globe, the only equivalent for heart in the human body is the prophets and saints among the human species, who are the chosen ones among the human beings, and the only absolute benefactors of the humanity.

Earth is indebted for its sound health to the equilibrium of species on its surface, and of elements in its depths. Likewise, human being is indebted for his sound health to smooth functioning of cells – each cell in its own group – and also to smooth cooperation between different parts of the body – knowing that each part of the body has its own group of cells.

As we address the terrestrial globe saying:

(All your ailments and diseases are caused by some of your species, exploiting your resources and your elements excessively and aggressively, on account of your other species, heedless of your global health and wellbeing, so your healing and medication lies in the fact that these tyrant species revert to their sanity, and relinquish their greediness, oppression and abusive force).

And as we tell Earth (as per Gaya Theory) that your diseases stem from you, and your medication lies hidden in you, so we tell the humanity (as per Imam Ali):

(Your healing power is in you, but you don't feel it;
And your disease stems from you, but you don't sight it).

As Earth medicates itself by the method of so-called vengeance of nature, so human body is curing itself through beneficial microbes and viruses defeat their harmful counterparts. The human body is a battlefield of continuous bitter battles between these two armies, each composed of billions.

If this method fails and the harmful army beats the beneficial army in a certain region of the body, other terrestrial creatures come to his help and medication, particularly the herbage. Also chemical medication comes to his help, which is composed of elements available in Earth.

In case the medicines and herbage fail to heal the patient, human may have recourse to transcendent spiritual states (prayers), which electrify the Human Magnetic Halo, thereby healing the disease quite often.

It is imperative that the patient be connected to the Fountain of Faith, which never runs out, and to Superabundance of Existence, which is pervading the cosmos and the space.

Human being is always a battlefield, wherein billions of bacteria, microbes and viruses participate. When the harmful ones attack a certain part of the body, the beneficial ones mobilize to defend that region.

If the beneficial ones subdue the harmful ones, human is mostly not aware of what has happened. But if the harmful ones subjugate the beneficial ones, the infected area emits warnings in the form of pains or weakness in the body, alerting the patient of the tragedy that has taken place.

Thereupon the patient becomes in need of medicine to appease his pains or restore his energy or rectify the damage occurred in that certain region of the body.

Researchers working on Human Genome have found that there are hereditary genes as well as attained genes, and that the latter are surprisingly much more than what was thought before.

All these genes are just organic copies of the Ethereal Original. The Magnetic Ethereal Human Halo is the first layer of the Ethereal Original, wherein lie the generic human characters, and the hereditary and attained aptitudes and abilities in the form of lights and colors.

It is obvious that the attained genes have accumulated gradually over a span of time, due to human relations and interactions with parents, brothers, sisters, neighbors, friends, schools, society and the surroundings in general, especially at childhood.

Thereafter, during the formation of the human personality they increase and accumulate more and more, as aftermath of his compulsory deeds, pattern of life, and voluntary bad or good deeds practiced by him.

Genome differs from man to man, and every genome displays the respective potential diseases, which a certain man may have, whereby he is susceptible to certain viruses and microbes available in his environment, society and other creatures - human, animal or plants - wherefrom the respective diseases may be transmitted to him.

The body interacts negatively with these new guests, wherefrom ordinary temporary diseases may originate, which may be cured after some time, or he may be afflicted by chronic ailments, which remain in the body for long time.

All these interactions are stored in his **magnetic identity.** Therefore, all diseases and ailments could be sighted in future in terms of their respective peculiar colors, lights, shades in the Magnetic Ether, which may be cured without handling the material body.

Consequently, it may not be necessary in future to carry out operations with the help of Bistoury on the human body.

We may ask ourselves this question: "What is a human?"

- Is he the apparent human face of different major human races, e.g., Yellow race, Negro race, Red Indian race, Caucasian race, and the respective features peculiar thereto, such as the shape of head, eyes, ears, nose, mouth, hands, legs etc.?

- Or is he the color of his hair, his eyes, his ears, his skin, the way he walks and the way he moves his body, limbs, head, hands etc.?

- Or is he the power of the five senses of sighting, hearing, smelling, tasting, and touching?

- Or is he his gracefulness and elegance, his briskness and agility?

- Or is he the blood, flesh, bones, muscles, limbs and nerves?

- Or is he the fluids which constitute 73 percent of his body?

- Or is he the interior parts of his body, which eyes cannot see in the course of normal life, unless at the time of autopsy and postmortem, e.g. the complex brain and the strange grey matter thereof, full of wrinkles, projections, bulges and protrusions?

- Or is he his solid spinal column?

- Or is he his complicated nervous system, spread throughout his body and is connected to the human brain? For example, the brain receives information from a certain part of the body, and consequently it sends its appropriate commands to that part to rectify the emergency situation.

- Or is he his organic heart, wherefrom diverge very delicate veins and arteries, about four times the length of the Earth circumference, spreading throughout his body, conveying pure blood to all his interior and exterior parts, and also to the finest parts of the body e.g. the grey delicate substance on the brain surface, of which the right and left semi-spheres of brain are composed, and also to billions of very minute tiny cells in the brain, eyes, ears, nose? The impure blood is then returned to the lungs to enrich it by oxygen, and to lever to purify it from the harmful lees and sediments, and to kidneys to purify the liquid part of the lees, and then the pure blood flows back to the heart to be

pumped out by the heart once again to all the interior and exterior parts of the body.

- Or is he much finer than all these? That which cannot be viewed except by microscopes, consisting of thousands of genes and billions of cells, microbes, viruses and bacteria, which play critical fundamental role in the formation of human beings.

- Or is he a Genome, which has been consummated recently, and which contains about 30,000 genes, some hidden in the sperm (chromosomes), and others acquired from the surroundings i.e. hereditary and attained genes? All the foregoing can be either sighted by unaided eye, before or after autopsy and post mortem, or by different precise microscopes developed by modern science.

- Or is he his characters, his moral and instinctive features, e.g., anger, stinginess, avarice, greed, generosity, selflessness, prudence, indulgence, patience, forbearance, ignorance, knowledge, understanding, tyranny, injustice, submission, obedience, sleep, awakening, feeling cold or hot, chastity, purity, abstinence, sexual drive, love, sincerity, hatred, hypocrisy, tendency for crimes or inclinations to spiritual transcendentalism?

In reality, a human being is the 'I' hidden in him – call it Soul or Will or just 'I' – which remains stable and constant in him during his lifetime from birth to death. It never changes and never gets old with the body. All the forgoing are just the tools of Soul or Will for running this short mundane life. These tools of Soul are just things that a human can see with unaided eye or through tools and instruments so far arrived at by humanity. But what human being has not arrived at is much more!

Science will take long time to discover completely the human secret. Unfortunately, most of us don't have patience, and are prone to judge based on information available now, and overlook the great facts and realities that are hidden from us, just because science has not arrived at them till now.

It is always advisable to heed the theories and hypotheses, which may be a key to some of these hidden facts and realities.

The aforementioned human phenomena are just copies from the original, or shadows of truth, or reflections of an actuality. It is worthwhile to search for truth and the original entity. Don't you notice that all the foregoing human features have no meaning or sense without Soul and Life?

Without Soul they are just terrestrial elements disengaging from each other – water receding to water and salt, calcium, potassium, sulfur, iron retreating to their origin i.e. Earth.

Without Soul these elements relate to dead world, which is just a chunk of different elements, not resembling human being in any way.

Let us heed what science will discover in future, even if our short lifetimes could not catch them up. It is advisable to have a liberal mode and open up our windows to truth, although it is hidden from us for the time being, instead of issuing final judgments, wherein we close our minds and deny in stubbornness.

Science is quite flexible; it never claims absolute truth. What makes science more flexible is our capability to embrace breakthrough theories penetrating through the facts and realities that we think are final.

Therefore, we should propel scientists to attain more sophisticated appliances to detect the human secret and photograph the Layers of His Soul. Such appliances would be too expensive and can be afforded only by rich nations.

Fortunately, such devices have begun to develop in discovering space, e.g., MIMI – or an equivalent of it – mounted on space telescopes CASSINI and IMAGE, in photographing magnetospheres of Jupiter and Earth. For this purpose, billions are spent by researchers in developed countries.

In the last 11 years, special cameras were installed on telescopes mounted on space observatories, e.g., Chandra, XMM-Newton, which photograph Gamma-rays and X-rays in the expansive cosmos that emanate from explosions of colossal stars, billions of light years away from us.

They photograph them in charming colors, which contemporary man is fortunate enough to see for the first time in history.

Also quite recently (end of year 2000) a camera fixed on CASSINI telescope, dubbed MIMI, could photograph magnetosphere of Jupiter, which is the largest planet in our solar system.

In fact, this magnetosphere is proved to be conical-like, resembling the falling raindrop, with a long tail and head. It is flexible and is distorted and takes the shape of a falling raindrop when the solar winds, consisting of plasma or electrified gases, buffet it.

A similar camera, fixed on IMAGE, has just recently photographed some parts of the magnetosphere of Earth.

It is well-known that mankind knew about part of terrestrial magnetic energy in the past, by tracing its effects on iron, magnetic elements and magnetic needle, dubbed mariner's compass, which used to guide mariners in the seas and travelers on the mainland.

Mankind even knew about the shape of its lines, by spreading iron filings on the paper put on magnetic elements.

These huge magnetospheres will supply us in future with too many details, revealing the secrets of Jupiter and Earth.

They will certainly facilitate for mankind very precise predictions and forecasts about atmospheric changes, cyclones and hurricanes, few months or even few years in advance.

What is strange about Jupiter's magnetosphere is that the exterior of its circumference has light color, and it has few protrusions like tails extending long distances into space, similar to receiving and emitting devices, wherewith it interacts with the Sun and other planets, which in turn have grandiose magnetospheres having tails as receivers and emitters.

All these have to be discovered and photographed in future by very refined advanced appliances.

There are about eight protrusions on the Jupiter's magnetosphere, which differ from each other in length and intensity, and in their respective functional tasks.

Such types of special cameras should be developed in future to photograph the human Magnetosphere or Magnetic Halo.

This event will be the first step of the human civilization outside the material range of cosmos, or inside what is called Metaphysics.

Part of this region is well-known in modern science as ENERGY FIELD, in the form of electromagnetic waves, the laws of which were discovered by Maxwell in the 19th century, wherefrom Einstein benefited in formulating his theories of relativity - special and general - and the beneficial effects thereof were utilized by Marconi at the advent of 20th century in his new invention of radio and by Beird in his new invention of Television.

But Maxwell, Einstein, Marconi and Beird never saw these waves by the aid of their eyes; rather they arrived at them by the aid of their effects and impacts.

Their discoveries and inventions were really turning points in the great scientific progress in the 20th century.

As science strove for long years to complete Genome, it has to strive for longer years to extract and complete the Human Magnetic Map.

In this map, we will be in a position to discover and photograph meticulous details about human secrets - his physical, moral and spiritual capabilities such as-

- Color of his skin, his hair and his eyes, etc.
- Shape of his head, his eyes, his nose, his mouth and his ears, etc.
- His stature, tallness or shortness.
- His way of walking, and movements of his hands, his face and whole body.
- His susceptibility to different diseases and ailments etc.
- His anger and his indulgence.

- His stinginess, his malignancy and his generosity.
- His cowardice, his bravery, his nobility and his gallantry.
- His lies and truthfulness.
- His aptitude for high or low degrees of knowledge, high or low degrees of spiritual ranks.
- His aptitude for personal clairvoyance, insight, acumen and keenness.
- His awareness with other worlds.
- His acquaintance with spiritual ranks and standings.
- His familiarity with degrees of transcendentalism, insight, acumen, vision, keenness and clairvoyance in others.

All these meticulous details have their respective peculiar colors, lights and shades in the Human Magnetic Fluid, brimming over with illuminated lines, curves and wrinkles, which indicate meticulous details about human features, characters and his susceptibility to health and illness factors etc.

The Human Magnetic Halo, like Jupiter's Magnetic Halo, has few protrusions like tails, similar to receiving and emitting appliances, wherewith he interacts with the surroundings – environment, human society, friends etc. – and also with modern TV programs, internet, all educational and entertainment media, and with nature and other Earthly creatures, particularly those which are abundant around him, like trees, plants, flowers, roses, vegetation and herbage, which has healing power over him.

He interacts also with pet animals, and even wild animals which he may watch on TV. He feels at ease about them, as he does about gorgeous green sceneries of nature, and he loves them because of these interactions.

It is not strange that such interactions take place with the Sun and its different planets, and even with stars and galaxies throughout the cosmos.

The human delight with the space science and the space explorations - which cannot be described - evidence my theory quite strongly and clearly. Delight is a positive face of such interactions.

The **human magnetic tails** meet the counterpart magnetic tails of the planets, stars and galaxies in the cosmos, having mutual impact and influence upon each other.

Just like magnetic tails of Jupiter, the human magnetic tails differ from each other in length, intensity and functional tasks as well.

The Human Magnetic Fluids challenge the barriers of time also, by remaining long times in the space, influencing generations that are not born yet.

The future generations interact with these long-living electromagnetic waves that fill in the expansive cosmos, whereby they admire the great heroes of history, particularly the pure saintly prophets and the men of God such as Mohammed, Abraham, Moses, Christ whose electromagnetic waves challenge faraway barriers of time.

Sheikh Sadiq Anqa, in one of his books, had predicted that modern science will arrive at the Human Magnetic Fluid and Halo, and photograph them in the near future.

He had propounded his theory as follows:

"Man is submerged into Magnetic Fluid or Halo, which cannot be detected by unaided eye, and which carries along secrets of human ailments in the form of colors and lights. Man will be able to photograph it and all the colors

and details thereof. Therefore, the future of medicine will focus on such fluid or halo, and that all surgery utilizing Bistoury and knife will be substituted by operations taking place on magnetic fluid or halo, without any intervention of sharp tools".

The points of receiving and emitting devices in the human body – corresponding to his magnetic tails – are 13 points. I hereby summarize what Sheikh Sadiq Anqa had mentioned in his book "Hidden Angles of Life":

(There are 13 points in the human body; or rather 13 magnetic cells, which are in perpetual connection with electric currents of Existence as follows:

1 – Solar Pit: It is located below Thorax and above Diaphragm. Its magnetic atoms grow up directly from sun light, its lines are horizontal that nearly intersect the nervous lines. **This cell is very influential in vital teachings and in modes, states and conditions, e.g., inclinations and tendencies, fear and love.**

2 – Human Brain: It is certain that its grey surface is in connection with the solar system in **a circle of 3 million kilometers diameter.** It is perpetually connected to Alpha waves and the mental waves. Therefore, this circle is called (circle of illuminated radiant thought).

3 – The Illuminated Vital Point in the Heart: It is a center of the spread of life. This cell is the perfect, wise and powerful manager, which is in continuous liaison with other cells. Most probably it is "The Human Point for Kingdom of God", a name propagated by religions. The faithful Sufi focuses on it and on the solar pit thereupon spreads it to the brain. **This unity of heart, solar pit and brain is the method adopted by Oweisi School,** and is in line with the teachings of prophets, particularly prophet Mohammed. Islam has emphasized on the presence of heart during

prayers. Prophet has said: "No prayers unless the heart is present". **This cell is the place wherefrom abstract splendors emerge in the system of the prophets.**

4 -Pit Between The Two Eyebrows: It is located directly above nose, and is the **crucial factor in telepathy**, and in the wonders of the sixth sense.

5 - Coxiga: It is located below the lowest vertebra of the vertebral column. It is triangular in shape, and is a crucial factor in the being of a man, and is one of the fundamental centers of life. The strangest thing in Coxiga is that it is the only part in the human body which does not decay and rot after death, and does not decompose into sand. **This cell is the factor of power and influence in others, and is crucial in reproduction.** The Hindu (yogi) is focusing on it and on the spinal column in his physical exercises and meditation.

6 - A Point in Epiglottis: It is the fleshy part overlooking the throat at the lowest part of the mouth ceiling. **It works like a radar, and is in connection with the mental waves pervading the space.**

The inventors and discoverers are indebted to this cell, because of its close connections with the Solar Pit. This cell is capable of spreading out the magnetic waves of the brain into the space to 12 kilometers or more in the form of a pillar of light.

This cell receives Alpha waves in harmonization with the cells of senses, resulting in sighting, hearing and smelling.

7 - A Point at the Head of Ganglion: It is in direct linkage with Coxiga. **When these two poles are in complete harmonization together as to influence the spinal cord, the human being can do miracles.**

8 – Cell inside the eyes for the sense of sighting.
9 – Cell inside the ears for the sense of hearing.
10 – Cell inside the tongue for the sense of taste and the power of talking.
11 – Cell inside the nose for the sense of smell.
12 – Cell inside the skin for the sense of touch.
13 – Lymphatic Nodes: It is the weakest cell in the human body.)

Each of the human characters, whether hereditary or attained from the surroundings, has corresponding gene in the Genome. Genes are tangible copies (or shadows or reflections) of the lights and colors in the Magnetic Map. That is to say, each of these characters has a glowing light peculiar to it in the **human magnetic halo**, emerging in the form of a distinguished color in this magnetic fluid, which has to be discovered and photographed by the modern science in future.

When we obtain the details of these gleams and charming colors of the magnetic fluid, we would be in a position then to research over many of the human secrets e.g. details about genes, cells, nerves, nervous system, blood, flesh, bones, muscles, liver, kidneys, spleen, intestines, lungs, brain, fat of eyes, bones of ears, and flesh of the tongue, whereby we sight, hear, taste and talk.

The most important organ that we would be in a position to discover its secrets is the heart, and its linkage to the dynamics of life. We will be in a position to oversight the science of living medicine – science of human organs in living action.

We will also find in this Magnetic Fluid or Halo all the tendencies and sensitive states of all parts of the body, and all the characters of a particular human being, and predict different kinds of diseases and problems hidden therein.

Cosmos
as one living entity

The Will had intended to create its visual, sensible and tangible manifestation, so there was this phenomenon brimming over with all its living and evolving constituents, elements and creatures, which configure this living entity called "cosmos".

There is no difference between this living entity which is visual, tangible, concrete and material and the Will that had created it, except for the fact that Will is its quintessence, and that humans see not the Will nor sense it nor feel it nor touch it, whereas they see cosmos, which is visual and sensible, and sense it, feel it and touch it.

In reality, the Will had created Life or a living entity called "cosmos".

We have stated in the foregoing chapter that Terrestrial Globe seems to the astronauts, who had been watching it from lofty heights, as one living entity, despite various species living thereon, and gross differences and variations between them.

The Terrestrial Globe, the human being and the cosmos, each continues as one living entity, despite the fact that each is harboring multitudinous independent living creatures. Each is like one guitar composed of many strings, each string producing a special sound, but the ultimate tone is one.

Likewise, a human being seems to us as one living entity, despite billions of living cells and billions of bacteria, viruses and microbes living therein - all apparently independent - and despite many parts of the body and limbs and too many of nerves and muscles functioning therein.

The Holy Koran is the divine address to us, except for one Sura, i.e., Al-Fatiha, that we so often repeat in our prayers, which is the only Sura wherein we address the Almighty God.

When we say: "Thee do we worship, and Thine aid we seek", we say "we" and we don't say "I"; namely, we do admit that we are not one but billions of billions - billions of our cells are worshipping Him, seeking His help, and beseeching from Him our redemption.

Also we do confess that billions of bacteria, viruses and microbes living in us, and multitudes of parts of our body and limbs, nerves and muscles are worshipping Him, seeking His aid and beseeching from Him our redemption.

In short, we do admit and confess that our full entity, with all living atoms of our existence, are worshipping Him, seeking His help and aid, and beseeching from Him our redemption - as one living entity composed of billions of billions of living atoms, cells, bacteria, viruses, microbes, limbs, organs, nerves, muscles, and other parts of our body.

It is certain that each cell is one living entity, and that cells are the building blocks of our life, whereupon we basically rely in all functions that we do perform.

Likewise, each virus or each microbe or each bacterium is one living entity, and that its cells are quite tiny, lacking nucleus which contains DNA and nuclear protein, and also lacking specialized membrane dubbed Organils.

Whereas human and animal cells are bigger, each having membrane and all its numerous specialized organs, and also having nucleus connected to the membrane, consisting of the genetic matter or DNA and nuclear proteins.

Likewise, cosmos or universe is one living entity for those who have fathomed its depths, despite multitudinous varieties of galaxies, stars, planets, etc. I do repeat that universe or cosmos is one entity; rather it is one living entity.

We do proclaim the underlining fact that whole cosmos is one family, and whatever is happening there is propelled by ONE WILL; and moreover, this WILL is wise, because we do seek reasons for any event occurring in the universe, either in our laws of physics or in some other laws of physics, that we do believe might exist.

That is to say, we do firmly and intuitively believe that any incident taking place in the cosmos should happen within the framework of wisdom, and no episode or phenomenon can happen randomly. It is a matter of intuition for us!

The absolute Soul or Will manifests in the universe, human beings and all the material world, and it is their quintessence, and is not separable whatsoever from the material world, but we cannot never ever detect it, see it with our eyes, sense it or touch it; nevertheless, we might be in a position to detect the Layers of Soul lying in between.

That is to say, science may detect Layers of Soul; or rather, science has already detected few of them by available tools and instruments, microscopes, telescopes that carry specialized cameras, which photograph fine objects, shapes, colors etc. in the ether, away from Earth, dust pollutions, air particles and other pollutions linked to the

atmosphere, and photograph also X-rays, Gamma-rays, etc.

Other very specialized cameras had photographed **magnetic halos**, like MIMI camera mounted on the space telescope CASSINI, which had photographed Jupiter's magnetosphere, and HENA camera mounted on IMAGE, which has photographed Earth's magnetosphere.

In the beginning of the year 2001, MIMI had photographed the invisible during the 6-month flyby of Jupiter by CASSINI spacecraft.

MIMI had detected flowing electrons along the planetary magnetic field inside Jupiter's magnetosphere, at a diameter measuring 143 thousand kilometers.

At the end of January 2001, CASSINI'S Fields and Particles instruments were making measurements of the Jupiter's magneto tail boundary, about 30 million kilometers from Jupiter.

This magnetosphere is described as "a bubble of charged particles" trapped within Jupiter's magnetic environment.

We let Applied Physics Laboratory News Release of January 25, 2001, speak for itself under the headline, "CASSINI camera sees the invisible during Jupiter flyby" as follows:

(CASSINI'S recent pictures of Jupiter are providing scientists with **never-before-seen images of the giant planet's magnetosphere** and underlying dynamics.

NASA's $3.4 billion CASSINI spacecraft is presently in a six-month flyby of Jupiter during a gravity-assisted swing toward Saturn and a four-year study of the ringed planet

that will begin in July 2004. Researchers using the flyby as an opportunity to try out some of CASSINI'S advanced instrumentation are reaping scientific rewards.

"Every new spacecraft carries instruments that expand our ability to see things," says Dr. Stamatios Krimigis, Space Department Head at The Johns Hopkins University Applied Physics Laboratory (APL) in Laurel, Md., and principal investigator for the Magnetospheric Imaging Instrument (MIMI) aboard CASSINI, **"With MIMI, we're able to visualize the invisible."**

The (MIMI) instrument includes an Ion and Neutral Camera developed by APL, a spectrometer built by the University of Maryland under Dr. Douglas Hamilton, and a high energy particle detector developed by Dr. Stefano Livi of APL and a number of co-investigator institutions.

"By detecting various energetic particles and discriminating among them according to energy and mass, the camera is able to obtain remote images of the global distribution of these particles," says Dr. Donald Mitchell of APL, who leads the camera science team.

From a distance of 6 million miles (9.7 million kilometers), MIMI'S camera has recorded pictures of Jupiter's energetic particle-filled magnetosphere. Sequenced into a movie, these images will eventually provide a large-scale look at the compression and expansion of magnetospheres as they are buffeted by solar winds.

"These images, when combined with the other MIMI measurements, demonstrate the ability of the camera to capture not only the shape and dynamics of the magnetosphere but also elements of its chemical composition," says Krimigis. "They reveal that the particles we're detecting - primarily hydrogen, but also oxygen,

sulfur and sulfur dioxide – are spewed from volcanoes on the Jovian moon Lo and spun out into Jupiter's magnetosphere, where they are trapped, energized and accelerated to high velocities. Then when collisions with other particles provide them with an electron, they become neutral and are able to escape the magnetosphere. And that's when we can detect them with our camera."

In addition to imaging the Jovian magnetosphere, MIMI'S instruments have also detected the presence of a huge nebula of particles enveloping Jupiter and extending out to at least 13 million miles (22 million kilometers) from the planet, according to Hamilton, the developer of another MIMI sensor that detected oxygen, sodium, sulfur, potassium and sulfur dioxide.

"All of these are constituents of the gas spewed out by Lo's volcanoes, thrown out of Jupiter's magnetosphere and eventually picked up by the flowing solar wind," says Hamilton. Other observations include detection of flowing electrons along the planetary magnetic field inside Jupiter's magnetosphere, according to Livi, who developed the magnetic spectrometer sensor.)

We also let NASA/JPL photo release dated January 31, 2001, speak for itself under the headline "CASSINI uncovers Jupiter's magnetic bubble" as follows:

(The image taken on January 4 and 5 by the ion and neutral mass spectrometer instrument on NASA's CASSINI spacecraft makes the huge magnetosphere surrounding Jupiter visible in a way no instrument on any previous spacecraft has been able to do. The magnetosphere is a bubble of charged particles trapped within the magnetic environment of the planet.

In this picture, a magnetic field is sketched over the

image to place the energetic neutral atom emissions in perspective. This sketch extends in the horizontal plane to a width 30 times the radius of Jupiter. Also shown for scale and location is the disk of Jupiter (black circle) and the approximate position (yellow circles) of the doughnut-shaped torus created from material spewed out by volcanoes on Io, one of Jupiter's large moons.

Some of the fast-moving ions within the magnetosphere pick up electrons to become neutral atoms, and once they become neutral, they can escape Jupiter's magnetic field, flying out from the magnetosphere at speeds of thousands of kilometers, or miles, per second.

CASSINI'S instrument for imaging the magnetosphere builds an image from these atoms reaching the spacecraft, analogous to a way a normal camera builds an image from photons.)

There lie different layers between the material world and the Absolute Soul or the Pure Will that manifests in universes, humans and the whole material world, and is their quintessence.

Few of the layers relate to the material world, although they cannot be seen. Some of them may be named as follows:

A - Bacteria, microbes and viruses in multitudinous numbers, relating to humans, animals, plants, solids and fluids, either residing therein or storming into from without - all cannot be seen by unaided eye.

B - Electromagnetic energy or light waves as follows:

1) Radio waves: Having very week energy and their wavelength is longer than that of infrared.

2) Infrared rays: Their wavelength is longer than red color.

3) Visible electromagnetic rays: Waves visible to the unaided eye, and we see them in the form of rainbow colors, beginning with red and ending with violet color.

4) Ultraviolet rays: Their wavelength is shorter than violet color.

5) X-rays: Their waves are very short and high energetic. Their wavelength is shorter than ultraviolet and longer than Gamma-rays.

6) Gamma-rays: They are the most energetic rays, and their wavelength is the shortest of all electromagnetic rays.

C – Cosmic rays.

There are some other layers which are little finer than the material world, and are called "Energy Field". We may name some of them as follows:

D – Gravitation force.
E – Coherence power of the nucleus of an atom.
F – Repelling power of the electrons of an atom.

But all the foregoing are still relating to the material world, which is no more than 4 per cent only of the cosmos. Most of this 4 percent is invisible and remains unknown to the civilized progressed mankind. Although they are well-aware of their effects but they have never seen most of them.

What mankind knows from this 4 percent is no more than a handful of sand in a child's hand, playing on a seashore,

whereas what lie before us are the oceans of unknowns that we know nothing about, as proclaimed by the famous English scientist, Isaac Newton, the discoverer of the law of gravity, in the last days of his life.

But what really lies between the material world - which contains only 4 percent of Cosmos - and the Absolute Soul or Will is the **dark matter**, which consists of Layers of Soul located between us and our Absolute Soul or Will.

It is part of the 96 percent of cosmos not accessible to us, despite all our mobilized genius, power of mind, unlimited financial resources, most sophisticated telescopes, microscopes, other most advanced devices, and most sensitive tools and instruments.

The 96 percent of cosmos comprises **dark matter**, which is about 23 percent of cosmos, and **dark energy**, which is about 73 percent of cosmos. Both these cannot be seen by us, neither by unaided eye nor by most advanced sophisticated human tools and instruments. Both are invisible, insensible and intangible.

Modern science was forced to assume them - and later believe in them - because the latest giant space discoveries stand in dire need of both of them, and cannot stand their ground without them.

It is possible for human science to go so far in future as to somehow nearly view, sense or feel the **dark matter**, by indirect methods.

Imagine yourself sitting on a chair in your office. Situated before you is a personal computer lying on a special table. On your left, there are books and papers placed on a side table. On your right is a TV set, and before you on the left is your library with books and documents.

Behind you on your left also are sofa sets with a table. Before you, behind you and on your left stand thick walls. Behind you also there is a wooden door. On your right there is a large window, most of it is composed of reflex glasses.

In the space around you crowd together bacteria, viruses and microbes in multitudinous numbers. Inside your body there are billions of cells. You are enveloped all around by radio waves, cosmic rays, gravitational force, infrared rays, ultraviolet rays, X-rays, Gamma-rays, Alfa and Beta rays. All these constitute only 4 percent of your office space.

23 percent therein is **dark matter**, which you cannot see and can never see. The rest 73 percent therein is **dark energy**, which you also cannot see and can never see. These two are pervading the whole space of your room and are not separable from the aforesaid material world.

The Absolute Will or Soul manifesting glaringly in universes, humans and the whole creation, and is their quintessence, is not accessible to the human science, but is visible to the insight of Faith and transcendent clairvoyance of the Spirit.

This Foresight sees Him only and nothing else. Before Him dwindle all the universes, fade out all mountains and wane all the phenomena of the material world.

The **insight of faith** views the Kingdom of God with all the angels at His service. It views the Manifestations of Perfection, Beauty and Glory of ONE God, Magnificent and Beneficent. The Almighty God mentions this state as follows:

KORAN 7.143: "When Moses came to the place appointed by Us, and his Lord addressed him, he said: "O! My Lord!

Show (Thyself) to me, that I may look upon Thee." God said: "By no means canst thou see Me (direct); but look upon the mount; if it abide in its place, then shalt thou see Me." When his Lord manifested His glory on the Mount, He made it as dust, and Moses fell down in a swoon. When he recovered his senses he said: "Glory be to Thee! To Thee I turn in repentance, and I am the first to believe".

This Absolute Will is hidden from the eyes void from Faith. It is verily hidden from the limited finite mind and intellect, which is beneficial only for the human management of this mundane life, and the scope of which is confined to human worldly benefits only.

This Absolute Will is not accessible to human tools and instruments, unless the **insight of faith** awakens within the materialist scientists.

It is the divine apparatus available within the human himself - called FAITH - which should be brought into play and activated in order to see Him.

Human being:
A miniature of cosmos

It is a scientific verity that the whole universe is primarily composed of certain basic elements, the number of which so far discovered is about 106, but it is believed that the number might be increased to 110 after some new supposed elements may be discovered in future.

This state of affairs relates to the material world, which only consists of 4 percent of cosmos. **Dark matter and dark energy**, which both together constitute 96 percent of the universe, are considered outside the range of the material world.

Some of the basic elements in the material world are rare, but the others are common like hydrogen, proton, nitrogen, etc.

Also **dark matter and dark energy** are evenly spread throughout the universes, and are ubiquitous. Therefore, whatever is common and ubiquitous in the cosmos remains so in the Human Entity as well.

In other words, human being can be considered as a miniature of cosmos, because human being is a part of cosmos, and is created from the same substances from which cosmos is created, but in a miniature form.

Therefore, human being is a miniature of cosmos.

The whole cosmos is ruled by One Wise Will. For example,

if I breathe, or if my heart is throbbing, or if my body needs sleep they are not due to my will.

If you breathe, or if your heart is throbbing, or if your body needs sleep, they are not due to your will.

If living creatures breathe, or if their hearts are throbbing, or if their bodies need sleep, it is not due to their will.

Then it is by whose Will?

This is verily the **unified will in cosmos.**

Also science is based on three questions about any event happening in the cosmos, i.e.,

What is that event?
How it has occurred?
Why it has occurred?

This in fact is the core of knowledge. This also proves that **will is wise**. Therefore, scientific theories are propounded to explain the wisdom behind any cosmic phenomenon.

If a galaxy - being the biggest object in cosmos, and is formed of many billions of stars - is orbiting the nucleus of the galaxy, i.e., the black hole, then what it does is not due to its will.

Also if electrons of an atom - being the smallest object in cosmos, and is composed of many electrons and a nucleus - orbit the nucleus of atom, then what they do is not due to their will.

Then by the Will of whom do the galaxies and electrons orbit their respective nuclei at these huge velocities?

Verily this is the **Unified Will in cosmos.**

We do propagate the true state that cosmos is one family, and whatever happening there is due to One Will, and that **this will is wise,** because we do seek the causes thereof in our laws of physics, or we believe there might be series of laws of physics peculiar thereto.

That is to say, that we do believe intuitively that any cosmic phenomenon happening here and there occurs in the frame of wisdom, and that nothing can befall randomly. It is just a matter of intuition!

Since we are speaking of cosmos and Earth as **living** entities, we are in fact adopting the bigger picture where the borderlines between Biology and Chemistry disappear, and Biology becomes the principal science and chemistry just part of it.

Therefore, we can generalize Fractal Rule in biology about the structural property of an object that consists of self-similar parts, and that the parts are smaller copies of the object, and so are the parts of the parts and so forth ad infinitum. **This rule may be generalized to cosmos as one living entity to prove that human being is the miniature of cosmos.**

The amazing and perplexing analogy between most colossal objects in cosmos and tiny, minute, infinitesimal objects that may be seen only under very strong microscopes is a fact obliging us to think hard, speculate and contemplate.

If it is not Unified Will in cosmos, then what is it?

It is quite strange that most colossal objects in cosmos are **ethereal fluids** like magnetospheres of Jupiter and Earth.

Likewise, microscopic infinitesimal objects are **fluid** also like cells.

It is really marvelous to notice that most of these objects are in the shape of a falling raindrop; namely conical-like.

For example, a living cell is conical-like just like the falling raindrop; its membrane - or surface tension of water as called in Physics in case of water - is not only part of its life, but also a faithful honest bodyguard preserving the vital functions of life inside the cell or raindrop, protecting them from alien intervention, and obstructing any undesirable thing from permeating through the cell or the raindrop.

As for giant ethereal fluids, we had already given examples of magnetospheres of Jupiter and Earth, the diameters of which reach millions of kilometers.

As for microscopic fluid entities, a cell may be cited as an example, which cannot be seen by unaided eye. Cells are the building blocks of all phenomena of life, e.g., human life, animal life, plant life etc.

Surprisingly, both these giant and infinitesimal tiny entities are similar, and this astounding analogy and resemblance in the material world is represented by water and its other liquid compounds.

These most colossal galaxies in cosmos and their rotation round their respective black holes talk for themselves better than eloquent orators!

These most infinitesimal tiny minute atoms and the rotation of their electrons round their nuclei speak for themselves about the dumbfounding and stunning analogy between the most colossal huge giant entities and the most infinitesimal ones in cosmos!

These giant ethereal fluids like magnetospheres of millions of kilometers in diameter utter for themselves and dispense with oratory!

These infinitesimal microscopic fluid entities, like cells, say much more fluent and eloquent than charismatic orators of history about the astonishing resemblance prevalent throughout cosmos!

These talk for themselves about the Miracle of One Creator and One Will and One Sovereign ruling all over the cosmos, universes and all the existence.

Does not all this fantastic similarity and analogy between giant and infinitesimal objects in cosmos dispense with human words to unfold the wonders of God and His power and supremacy in His authority, mastery and upper hand over all existence?

The human eloquence falls short of expressing His miracles; human tongue is impotent to reveal His pomp and grandeur; and oratory is powerless to divulge and uncover the Unified Existence and Unified Will manifesting in Human beings, on the Earth, in Cosmos and all over the Existence!

A thought is a bird of sky; but if expressed in words, it remains a bird but confined in a cage of words, stretching its wings, but like a crippled bird in the cage.

It is up to the reader to utilize his insight and clairvoyance to comprehend the absolute thoughts outside the limitations of words.

Space science has accomplished giant discoveries in cosmos in the last 20 years, and still continues to do so.

This was and is possible because of telescopes mounted on space observatories functioning away from Earth just outside the atmosphere.

On these observatories are installed very advanced and sophisticated outfits and equipments, very specialized cameras and very sensitive tools and instruments, in order to photograph our galaxy – milky way – and remote galaxies, stars, black holes either in colors of normal visible rays, as in case of HUBBLE, or in colors of infrared and ultraviolet rays, as in case of some specialized satellites, or in X-rays, as in case of space observatories XMM-Newton and Chandra, or in Gamma-rays, as in Chandra.

The discoveries of the last 20 years in space and cosmos sciences are considered stunning and dumbfounding.

Because of the photos that have come from these satellites, the scientists have discovered that all the radiating matter, contained in the cosmos, which may be seen either by telescopes or detected by sophisticated appliances, don't exceed 4 percent of the cosmos.

23 percent of the cosmos is composed of an unknown matter, which is neither seen by eye nor detected by modern giant devices, and therefore scientists dubbed it as Dark Matter.

The rest 73 percent of the cosmos consists of an unknown energy dubbed as Dark Energy.

Since the human entity is a miniature of cosmos, the Dark Matter in him is already there, and is called Layers of Soul, which are the intermediate layers between Soul and the material body, that cannot be seen by eye nor detected by human sophisticated appliances.

The material world develops gradually from weighty, heavy, dense and thick to transparent, delicate and light; from giant objects in cosmos to small objects like humans, animals, trees, plants etc., to tiny creatures like microbes, bacteria and viruses, to molecules, to atoms, to energy field or magnetosphere or halo that envelops the matter, to transparent and delicate entities, and then to Layers of Soul.

Almighty God has created the Layers of Soul as a support to normal matter, and for the organs and limbs of the body to grow, and for formation of the identity, personality, shape and coherence of the organs and limbs.

He has created them in order to give the man himself his identity, personality, shape and coherence.

Almighty God has created Layers of Soul as a support to human psyche, in order to help it practice its mundane life easily.

Without them, human psyche would be motionless, void of dynamics of instincts, desires, sexuality, urge for work and for reproduction, etc. Therefore, life would be meaningless, and would have no sense whatsoever.

But in response to all this favor and grace, that the Layers of Soul present to human psyche in terms of lust, desires, sensuality, craving, hunger, appetite for delicious foods and lusty sexuality for reproduction etc., the psyche eventually turns its back to its benefactor and betrays the soul and its kingdom, whether the man knows it or not.

Imam Ali had said:

(The psyche gets involved in satanic acts, and is exposed to ordeal. He becomes a fugitive slave running away from

Beneficent God in pursuit of mundane affairs, with those who attend this world and seek it in humility, pursuing their lead and model.

The psyche pursues pleasure, lust and excessive desires, and is obsessed by satanic delusions. The lusty whims and caprices cause him to tumble down into abyss of futility and vanity, greed and avarice.

What narrow is this prison in which the human psyche is confined, although the man himself is not aware of and thinks he is acting right!

He does not know that he is like a traveler stopping at a motel, or camping under a tree, resting for some time in transit, thereafter passing across to the destination, and traversing temporary transitional station to immortal, perpetual and everlasting abode.

Because of lack of awareness, the human psyche slumps into misery and wretchedness, his spirit is dispersed and his stumbles become numerous.

Never have pity on them! Their exterior paved concrete has become a mirage, and their interior structure is now a ruin. They cannot shield themselves against impending disasters and calamities of life, nor can they take shelter from catastrophe.)

What has afflicted the Holy Soul within these miserable entities!

They have tumbled down into the trap of misery and suffering, into the snare of distress and misfortune, which have been well prepared by the human psyche itself.

The cunning Satan has penetrated their hearts and has

played dirty games there deceiving and deluding, and has entered their minds wiping out reason and sense, and has severed all the friendly connections and links with the genuine Layers of Soul and with the immortal Kingdom of Soul.

They have since long acquiesced to miserable friends, and pursued their lead. They have really perished in their interior structure.

They have mistaken pleasure for happiness; therefore, they drown down into the swamp of wretchedness!

They have mistaken amusement for serenity and tranquility; therefore, they undergo nervous disorders!

These human entities are not uncommon in the society.

As regards Dark Matter unknown to humanity, it constitutes 23 percent of cosmos. The scientists assumed that it exists, because the galaxies could not exist without it, since their velocities around their nuclei – the black holes – are much bigger than what their visible mass alone can explain.

As for Dark Energy, it was discovered at the end of the 20^{th} century, when NASA astronomers discovered it in year 1997 and later announced it in year 1998.

They had noticed that the universe is expanding, not at constant rate, but at an accelerating rate. That is to say, its speed is increasing every moment, and that the distant galaxies recede away from each other at an accelerating rate.

Before it Edwin Hubble, the American astronomer, had discovered in the twenties that the universe is expanding.

The scientists then were stunned, although he didn't say that universe is expanding at an accelerating rate.

Imagine how much more were they astounded when they came to know at the end of the 20th century that the universe is expanding at an accelerating rate, and that the remote galaxies are moving away from each other, not at a constant speed, but at velocities increasing at every glimpse!

It was inevitable that they should acquiesce eventually to the great glaring facts of the universe; therefore, they assumed a great energy in action in our universe, and dubbed it Dark Energy, which fills the whole cosmos.

Streamline scientists were not convinced at the end of the 20th century, but ultimately, at the advent of the 21st century, they were convinced that such energy exists.

Since human entity is a part of the universe, or since it is a **miniature of the universe**, dark energy in cosmos must exist in the human entity as well. In fact, it is there and is called Soul.

This energy existing in you and me - and in every human being - had started as a lightning flashing in you in the fourth month of the embryo, thereafter only the heart began to beat and the flesh and bones started transforming into parts of the body.

As per the Holy Koran (addressing angels), the Soul that started flashing in us is from Almighty God breathed by Him into us.

Koran 15:29 and 38:72: "When I have fashioned him (in due proportion) and breathed into him of My spirit, fall ye down in obeisance unto him".

God has deposited **His Own Specimen** into you and me - and every human being - with all divine secrets, hidden treasures and heavenly torchlight.

In all of us this **Divine Specimen** is yearning to the **Original Benefactor**, to our Original Inborn Essence of Initiation.

Most of us neglect this longing whisper; instead, they acquiesce to Satan as aforementioned.

But in some of us this **detached divine specimen** - Soul - resembles the torrential stream flowing forcefully - with might and power - towards the mother sea, carrying along secrets of valleys and hills, anthems of forests and sands, treasures of precious stones, magnificence of towering mountains, toughness of deep-rooted stones, and carrying along firmly established interior stability, security, serenity, tranquility, and calm Soul, satisfied, content and pleased.

Imagine that you are sitting in your small room, in meditating mood, and the room is full of furniture, be aware that whatever you see in the room, either by eye like furniture or by microscope like multitudinous tiny infinitesimal creatures that fill the space around you in billions of billions like viruses, microbes, bacteria, be aware that all these don't exceed 4 percent of what is available in the room. The rest is filled by **dark matter and dark energy**.

If you look at yourself and at your body, be aware that whatever is contained therein, e.g., fat, flesh, bones, head, hands, legs, trunk etc. along with billions of billions of cells, viruses, microbes, bacteria - don't exceed 4 percent of all that is carried by you. The rest is filled by **dark matter and dark energy**.

Is it not worthwhile to contemplate and ponder about? So where is the rest of your entity? The visible and tangible section of your entity - which by itself is brimming over with secrets - represents only 4 percent of your entity, as proved by modern science. Most of the secrets in this 4 percent are not discovered by science as yet.

How far the science develops and advances, its scope is always within 4 percent of Cosmos, even if the science continues in its researches for thousands of years.

But if science permeates the borders of dark matter, it will be a turning point in the history of scientific pursuits. Scientific researches then would extend to human Layers of Soul, beginning with Halo or Magnetic Fields or Magnetospheres surrounding the material world.

Since human being is a miniature of cosmos, whatever is discovered about the major constituents of the universe - e.g., 4 percent material world, 23 percent Dark Matter and 73 percent Dark Energy - is valid for human being also, who is composed mostly of Dark Matter and Dark Energy, as affirmed and verified by science.

Anyhow, I am not inclined to use this terminology, when human being is my thesis.

Human being is mostly composed of Soul and the Layers of Soul encircling the Soul, which is penetrating, through blood, the most delicate human veins and arteries, spread throughout human body.

Well strangely, the veins and arteries, if stretched, their length reaches four times the circumference of Earth.

The definition of **absolute soul** that it is invisible is closer to the definition of Dark Energy, which can neither be seen

by unaided eye nor by human most sophisticated tools and instruments.

Likewise, the definition of **layers of soul,** which encircle the absolute soul, that they are invisible is closer to the definition of Dark Matter, which can neither be seen by unaided eye nor by human most advanced apparatus, appliances and devices.

As for the visible universe which constitutes only 4 percent of the universe – as aforementioned – it is a manifestation of **absolute will (or absolute soul)** that willed to create it as visible, sensible and tangible material world, and be its quintessence.

As detailed elaborately in the annexes 2 to 16, 48 and 54 the characteristic of Dark Matter is to give the galaxies their shape, support their coherence, and build up their peculiar identity and personality.

Likewise, the Layers of Soul[10], that separate our material body from our **absolute soul,** give human being his shape, his coherence, his personality and his peculiar identity.

Without the Layers of Soul it would be impossible for human flesh, fat, bones, muscles, nerves, limbs to impart the human being his shape, coherence, personality and identity.

As per annex 9-a about the clumps of Dark Matter:

"The unprecedented quality of these data enabled the astronomers to measure the **shapes and orientations** of

---

[10] One example of Layers of Soul is the halo or the magnetosphere that embraces each of the stars and planets, like the halo or the magnetosphere of Jupiter that was photographed by MIMI – a special camera mounted on the space ship CASSINI. It was photographed at the end of year 2000, and its colored photo was published in space.com dated January 25,2001 – please refer to my book called WHAT IS SECRET OF LIFE?

the images of more than 70,000 galaxies with very high precision. After a careful statistical analysis, they were able to demonstrate that the distant galaxies are not randomly oriented on the sky - they show **a certain degree of alignment over substantial sky areas** ... The astronomers refer to this as a **coherent orientation**".

And as per annex 11-a:

"After the Big Bang, estimated to be between 12 and 15 billion years ago, **the universe was composed mostly of Dark Matter** ... A relatively smooth distribution of dark matter and **some normal matter**, mostly hydrogen atoms, **permeated the young cosmos** ... But lumps and bumps developed, **catalysts that were destined to form something.**"

And as per annex 11-b:

"The process began just 13 million years after the Big Bang. Small perturbations had formed in the fabric of the universe. After 100 million years, **Dark Matter is attracted to these "density fluctuations" ... Over time, several drew together to form one larger clump.**

Atoms of hydrogen are pulled in, too. The hydrogen is compressed and heats up much like the air in a tire warms as you pump more air into it. Some hydrogen atoms, now pressed more tightly together, combine to form molecules - molecular hydrogen.

The result is the development of a molecular cloud, something seen in our own galaxy today and known to be a precursor to **star formation**. After 155 million years - an eye blink in cosmological terms - **a cloud of normal and Dark Matter has built up the mass of a million suns. In the center, a star about the mass of our Sun is born - the very first star in the universe.**"

And as per annex 48-b:

"**Other studies show black holes**[11] **play an important role in overall galaxy formation. The formation of massive black holes is critical to the formation of new galaxies** ... In the first few billion years after the Big Bang, when things were more crowded and chaotic, **black hole jets probably triggered star formation in many nascent galaxies.**"

And as per annex 54-d:

"It becomes more and more clear that super massive black holes **can significantly change the structure and evolution of galaxies** ... In the blink of a cosmic eye – just half a billion years – **invisible spheres of matter were born, and several gained the mass of a billion or more suns and were driving the shape and texture of swirling agglomerations of newborn stars.**"

Soul had – and continues to have - an absolute role, along with its army of **Layers of Soul**, in the birth and formation of eyes, ears, nose, mouth, hands and legs of the embryo, and also in the birth and formation of other exterior and interior parts and limbs of the body, and also in the birth and formation of regular human face, figure, form, stature, etc.

Afterwards the embryo develops to a perfect human, then rises gradually from childhood to youth and adolescence; thereafter, progresses by steps to middle age and then eventually to old age.

As per annexes 23-b and 23-c:

"This leads to another idea called "quintessence" (for fifth essence) which proposes a repulsive field embedded in

---

[11] Black holes are part of Dark Matter.

space, not unlike a gravitational field or a magnetic field ... The field was created in the early moments of the universe along with the other forces in nature, and now stretches across the universe like a spider web.

As the universe expanded and cooled, gravity and quintessence were locked in an arm wrestle for dominance over space. Both fields weakened with the universe's expansion. But ultimately quintessence won out over gravity and took control to push galaxies apart."

Likewise, the Soul had emerged in the embryo in his fourth month as a flashing lightening.

The same scenario that takes place between quintessence and gravitation, on cosmos level, happens in human being also, who is a miniature of cosmos.

On the cosmos level, it is strife between quintessence and gravitation, whereas in human being it is conflict between Soul and Psyche. In the human being also both forces cool down and subside with the progress of human age.

It is required from this human, whom God has elevated to a higher status by empowering him with the privilege of selection, to make the **soul** overwhelm the **psyche**.

Such a gift is not given to any other creature, including animals, plants, solids, fluids etc. Therefore, man has to strive, toil and work too hard to make Soul victorious over Psyche.

Soul does not cancel the role of Psyche, as Dark Energy does not cancel the role of Gravitation. Almighty God has granted to each of them its own role and its own peculiar function.

As gravity force preserves the local and regional areas of the universe; likewise, Psyche conserves the mundane affairs, despite their short lived lifetime.

But man belongs to a great kingdom - Kingdom of Soul - roots of which extend to the depths of eternity and immortality.

It is not advisable for a wise man to sacrifice the **kingdom of eternal soul** for short lived mundane affairs, which will perish very shortly.

Each mundane life has a short cycle of life which will pass away very soon. A wise man should not sacrifice the **eternal kingdom of soul** for a perishable mortal world. Rather, he should save for his immortal life the provisions and reserves peculiar to that life - the **Afterlife**.

Imam Ali says:

"Therefore, Almighty God had sent His prophets along with Holy Books, and cautioned us against an enemy hidden in our chests, whispering intimate discourse into our ears.

This enemy is misleading and knocking down, promising and entertaining hopes, decorating sins and evil crimes, simplifying grave sins and offenses.

When the victim is induced, allured and trapped up in the snare, the hidden enemy would then deny what he had ornamented, magnify what he had simplified, and caution what he had assured."

The great keen insight and clairvoyance of the prophets of God is more crystal clear than our vision. Their kingdom is not from this mortal Earth. Their brow seeks either

heavens or the thorns of the ignorant criminals and the tyrant unbelievers. They are not born for mundane Earthly crown. They don't seek any kingdom except Kingdom of Soul.

Whereas those who cling to this mortal life and betray the **immortal kingdom of soul**:

- Tumble down to the grottos of their greed and avarice,
- Build up their false mortal glories on the skulls of their mundane accomplishments, meant for mundane transient fame,
- Seek the glories of crowns which ultimately fade and dim, crave for the false hypocritical praise, beg and postulate such glories with servility, glories that are illusory and imaginary, false and impermanent, those which vanish or abate with the political and social changes in the course of this life, or with the extinction of the human race itself, both quite commonplace in cosmological standards.

The prophets of God shun such false transient glories. They are only concerned that their **eternal divine message** be applied to humanity, and that humans follow their lead and implement the **divine message.**

Their blowing soul and the music coming out from their trumpets is not from them, it rather originates from God. If it would not be the pure wish of their Creator, these innocent prophets would have torn asunder their childish clothing and would have flown back to the heavens.

How could those who embrace the Earth with their wings, take a refuge in a forgotten nest, or in a relinquished cave, or in a miserable hut, or in an evil haunt, or in a little hole, or in a lair of a lizard, or in a den of a hyena!

As the Dark Energy defeated the gravity force before 6.3 billion years, in a critical historical turning point; likewise, each of us has to cross a turning point and traverse a dangerous bridge, where so many feet slip, and so many horrifying stumbling blocks lurk.

This bridge is a passageway:

- From stubborn clinging to the mundane transient sinking world to the **immortal kingdom of soul,**
- From the lowest bottom of life to **the most exalted position** of life,
- From keeping distance from God to **the highest rank of nearness to God,**
- From abandonment and alienation of unified existence to **fine merging with the unified existence,**
- From narrow mentality of arrogance and pride to the **immortal level of thinking,**
- From clinging to vanishing world to **love for the eternal afterlife.**

Imam Ali had said:

A man is jubilating at the glad tidings and good omens, rejoicing at the ease of blessing:

He who controls his lust by voluntarily abstaining from it,

- Whose remembrance of God is moving his tongue,
- Whose fear of God is preparing for him the life of security,
- Who is avoiding mundane thoughts that distract him from the clear way of God,
- Who takes the most moderate purposeful path to the holy goal,
- Whom complexes of pride would not twist out of rightness,
- From whom the fishy doubtful things would not be concealed,
- Who has antipathy and repulsion against any sign of pride,

- Who is inclined to the Eternal World,

Such a man is in the best comfort of his sleep and the best state of security, and has laudably traversed the passageway of this mundane world, and has happily gained the provisions of the afterlife.

He is rushing to perform good deeds out of God's fear. He is in hurry to obey his God in the time limit. He is pursuing the devotion of God out of craving and desire. He is in perpetual escape from sins. He is watching today his tomorrow. He is always looking forward.

It is enough that paradise is the gift and reward! It is enough that hell is the curse and punishment! It is enough that God is advocate and avenger! It is enough that Koran is the authority and is opponent!

Since God has warned beforehand and there is no excuse left, and has argued and given proof of His open way.)

Science has mentioned that Dark Energy, Dark Matter and gravity force all were created in the early moments of the universe. Science has also mentioned the role of dark matter in the formation of the cosmos, and that at the beginning there was no normal matter, which had grown and developed due to dark matter.

As Dark Energy and Dark Matter were there at the beginning, they will be there at the end, in order to restore and repeat the **creation** once again.

In the human being, his **Soul** will remain after his apparent death, and his **Layers of Soul will continue to be his identity, which will remain alive for ever.**

Cosmos: Brimming with Life

Most of the western scientists believe that there are universes other than ours. Few of them, particularly those who believe in one-dimensional String Theory, believe in the infinite endless universes parallel to each other.

From religious point of view, we do notice the word Lord of Universes repeat too much in Holy Koran, and there is nothing called "Lord of Universe" in our religious culture. Therefore, we usually use the word Existence to indicate the infinite universes, including our cosmos.

It is a well-established fact in modern science that life exists throughout the cosmos, hence SETI activities within NASA for the last few decades.

We have mentioned in our book "What is Secret of Life?" pages 21 to 25, the following scientific facts:

"It is quite strange that most of life in the ethereal and microscopic regions are in FLUID STATE, and have been created in RAINDROP SHAPE, wherein its membrane - or surface tension - is a part of the life; or rather, it is a staunch watchman preserving the vital functions inside the droplet, and preventing the unwanted things to penetrate it.

As regards the ethereal fluids, we have cited some examples of magnetospheres of Earth and Jupiter, the diameters of which reach millions of kilometers.

As for microscopic fluids, they are mostly represented by cells that cannot be seen by unaided eye, and which are the building blocks of all phenomena of life, e.g., plants, animals, humans etc.

Amazingly, water and its other fluid compounds are the symbols of this analogy in the material world.

But what is the point at which chemistry becomes biology? Or rather, what is the point at which the chemical (dead)[12] elements become the biological (alive) elements? And why does this intriguing analogy between giant mammoth ethereal objects in cosmos and infinitesimal microscopic objects in cellular realm exist?"

Jeff Foust in his article dated January 30, 2001, in (spaceflight now) writes as follows:

(The chemical building blocks necessary for the formation of life on Earth, as well as rudimentary structures that could have been the basis for the first cells, may have come from outer space, one group of scientists has concluded.

In a paper published Tuesday, in a special issue of the journal, Proceedings of the National Academy of Science, researchers from NASA's Ames Research Center and University of California Santa Cruz **said conditions in the early solar system were ripe for the formation of critical organic compounds and even cell-like structures,** although they stopped short of saying that life itself originated in outer space.

---

[12] We have already mentioned in an earlier chapter the dialogue of Imam Sadie with his student Jabir Bin Hayyan, where he stated the following cosmic fact: "Tell him that this material world, created by Will, is the life itself. You well know that everything in this world is throbbing with life; even hard rocks throb with life, not to mention plants, animals, humans, rivers, oceans, etc." Therefore, there is no dead matter or dead chemical element in this existence.

Scientists took a mixture of simple ices, including water, carbon dioxide, carbon monoxide, and methanol and cooled it to just ten degrees above absolute zero. That super cold ice mixture was then exposed to strong ultraviolet radiation to mimic conditions in the dense molecular clouds from which solar systems form.

While scientists expected that the ultraviolet radiation would create new, more complex chemicals within the ice, the amount and complexity of the new compounds surprised them.

"Sure, we expected that ultraviolet radiation would make a few molecules that might have some biological interest, but nothing major", said Lou Allamandola, a NASA Ames scientist. "Instead, **we found that this process transforms some of the simple chemicals that are very common in space into larger molecules which behave in far more complex ways, ways which many people think are critical for the origin of life, the point in our history when chemistry became biology."**

If such complex organic chemicals were formed in the early solar system, they would have been the primary source of the compounds on Earth that were the building blocks for the origin of life.

"Every year more than a hundred tons of extraterrestrial stuff falls on the Earth, and much of it is in the form of organic material," explained NASA Ames space scientist Scott Sandford. "In the early life of our solar system, before the debris from its formation was fully cleared away, these materials were deposited on the Earth in far greater quantities than we see today. Thus, much of the organic material found on the Earth in its earliest years probably had an interstellar heritage."

Not only could such chemicals provide the raw materials for the formation of life, they may have helped provide the structure for the first cells, according to another member of the team.

"Upon the addition of liquid water to the organics produced during ice irradiation, some of these new compounds, with no outside help, organize themselves into tiny vesicles with complicated structures," said Jason Dworkin, a SETI Institute researcher and lead author of the journal paper. **Vesicles are hollow droplets that resemble cells in size, shape, and structure, but have inorganic origins.**

Dworkin noted that the vesicles included other chemicals, **including one that converted ultraviolet light into visible light. "Molecules that do these things are thought to be extremely important for the origin of life,"** he said. **"Membrane structures are necessary to separate and protect the chemistry involved in the life process from that in the outside environment, and all known biology uses membranes to capture and generate cellular energy."**

Such findings may boost the prospects of Panspermia, a controversial school of thought that suggests that life may not have originated on Earth but instead started elsewhere and was transported to Earth by comets and asteroids.

However, the researchers noted that while the chemicals and membrane-like structures found in the ice could be critical to support the formation of life, they alone were not necessarily sufficient for life to form.

"Membranes are like a house," Dworkin said. **"Maybe these molecules were just the raw lumber lying around that allowed origin-of-life chemicals to move in and set up housekeeping or construct their own houses."**

Some members of the team are keeping an open mind to the issue of the origins of life. "**We are just now beginning to realize that we are only seeing the tip of the iceberg in terms of extraterrestrial molecular complexity,**" said Allamandola, "I know I hold a minority view on this nowadays, but I suspect that even deep inside a comet, which is mainly water ice[13] after all, reactions are much further along than we think and the chemistry quite complex."

The discovery also raises the prospects of the formation of life in other solar systems. Irradiation of ices "happens all the time in the dense molecular clouds of space," said Allamandola. "**Very complex organic molecules that might be important for the origin of life could well be falling on the surfaces of newly formed planets everywhere in the universe... This discovery implies that life could be everywhere in the universe.**"

We also let a European Space Agency Science Report dated January 31, 2001, speak for itself under the headline, "**The first 'ringed molecule' found around stars**" as follows:

(Life as we know it is based on the ability of the carbon atom to form ring-shaped molecules. But rings of carbon are not exclusive to Earth, as experts in space chemistry now know.

A Spanish team of astronomers that observed with ESA'S Infrared Space Observatory (ISO) report the first detection in interstellar space of benzene, the ring molecule par excellence.

---

[13] Please refer to a later chapter in this book named **Mountains From Sky Wherein is Hail** mentioned in the HOLY KORAN 24.43: "He sends down from the sky Mountains wherein is Hail. He strikes therewith whom He pleases and He turns them from whom He pleases. The vivid flash of their lightning well-nigh blinds the sight", whereby referring to comets which are mainly water ice.

They think benzene is produced by stars at a specific stage of evolution, and that it is an essential chemical step towards the synthesis of more complex organic molecules whose true nature is still unclear – although their fingerprints are very conspicuous in the Universe. In industry, benzene is obtained from petroleum and has many uses.

Benzene is made of six atoms of carbon chained together to form a ring, plus six atoms of hydrogen, one per carbon. This structure was discovered in 1865 by the German chemist August Kekule – who would later say a dream inspired him.

Chemists know today that benzene-type molecules make a whole family of compounds, called 'aromatic' hydrocarbons, because of their smell (they are basic constituents, for instance, of perfumes and candles).

Astronomers also expected to find these ringed molecules in space, where long strings of carbon atoms have been detected. Moreover, it had been postulated that certain compounds of yet unknown nature, that are known to be very abundant in space, are actually aromatic hydrocarbons.

These compounds have left their chemical fingerprint, the so-called 'Unidentified Infrared Bands' or 'UIBS', in many places in the Universe, and although the labs have not yet been able to confirm their nature for certain, many astronomers already call them 'Polycyclic Aromatic Hydrocarbons', or PAHS.

Where to look for the ringed molecules? Around carbon-rich old stars, thought the astronomers. When stars of intermediate mass - up to about three solar masses - become old, and reach the 'red giant' phase, they begin to release huge amounts of gas and dust into their environment,

because carbon is produced by the nuclear reactions in the core of the star, many carbonaceous compounds are present in the dust expelled by the red giant star.

The team, led by Jose Cernicharo (Instituto de Estructura de Ia Materia, CSIC), chose a typical red giant star to start the search. But it did not work: the star did have carbon-based molecules, such as acetylene, but not ringed molecules. It did not have any UIBS either.

So the astronomers turned to an even older star, a 'proto planetary nebula' – a star that is about to 'die' via becoming a 'white dwarf' star surrounded by a beautiful cloud of glowing dust and gas. They focused on the proto planetary nebula CRL618 (Image is taken by the ESA/ NASA Hubble Space Telescope).

"We knew that, in a proto planetary nebula, the dust ejected in the previous red-giant stage is bathed in powerful ultraviolet radiation coming from the central star, which also emits high velocity winds. The radiation and the winds break up the carbonaceous compounds in the dust and trigger new reactions. We thought benzene could be formed in this way, a process that we could call polymerization of acetylene in evolved stars", explains Cernicharo.

This time the idea was correct. As published in the January 10 issue of 'The Astrophysical Journal', they have found benzene in the surroundings of the CRL618 proto planetary nebula. The authors think that there could be a few molecules of benzene per cubic centimeter, a value considered to be high, although the estimated density of molecules of all kinds in the area observed is ten million per cubic centimeter.

The team thinks that this molecule is the 'missing link'

between the simple carbon molecules observed in red giants, made of no more than eight carbon atoms, and the complex molecules responsible for UIBS, known to be made of hundreds of carbon atoms.

This theory therefore implies that the UIBS are indeed due to aromatic hydrocarbons, a possibility that, according to the authors, becomes stronger after the first confirmed detection of an aromatic molecule in spáce.

The 'missing-link' idea is based on observations of objects at each stage of evolution. UIBS have been detected around stars that are already 'dead', the 'planetary nebula', but not in the previous evolutionary stage of proto planetary nebula – such as CRL618, where benzene has been found.

The transformation from proto planetary to planetary nebula **lasts for no longer than a thousand years, a quick process in astronomical terms** – as an example, the central star of CRL618 was still a red giant only a few centuries ago, and will become a 'fully formed' planetary nebula in a few thousand years.

As Cernicharo says, "The molecules causing the UIBS must form in the relatively short period from proto planetary nebula to planetary nebulae. It seems that carbon-rich proto planetary nebulae are the best organic chemistry factories in space".)

We deduce from the aforesaid facts that cosmos is a living entity throbbing with life, from both religious and scientific points of view.

From religious point of view there is no dead matter or dead chemical element at all in the universe. In other words, chemistry and biology are to be considered as one thing, and the point at which chemistry becomes biology is an imaginary point.

That is to say, the point at which (dead) chemical elements become (living) biological elements is an imaginary point, because the apparently dead matter is in reality not dead but rather pulsating with life, **as expressed by Imam Sadiq in his famous words: "Even hard rocks are throbbing with life."**

From religious point of view life is symbolized by movement, and even science has proved that everything is in state of movement, including celestial bodies as well as cellular realm and even an atom which is the building block of everything in the material world – where electrons rotate very fast around the nucleus of the atom - and even Quark-Gluon that are the incredibly infinitesimal parts of the nucleus of an atom – which were dominant in super fluid state in the first 300,000 years of the beginning of the universe - were in violent movement, **as described in detail by Imam Ali in the next chapter called: "Imam Ali speaking about formation of cosmos."**

The wonderful strange resemblance between giant mammoth ethereal objects in this cosmos and very minute infinitesimal microscopic objects – both in the shape of a raindrop – proves beyond doubt that (Relativity) physics and (Quantum Mechanics) physics are in fact one physics, and that the smallest quantity of energy (which may exist independently) has in fact analogy with the greatest energies of existence.

The crucial factor which eliminates all these differences and unifies the Physics is water and its other liquid compounds, which symbolize this analogy in the realms of matter and energy.

Therefore, cosmos is one living entity brimming with life, as human being is one living entity throbbing with life.

If the barriers are broken or have almost faded between chemistry and biology – as latest scientific findings have proved – or as Imam Sadiq had said that the whole world is pulsating with life, and if the human being is composed of parts similar to the compounds prevalent in the cosmos, then Fractal Rule in biology about the structural property of an object that consists of self-similar parts, and that the parts are smaller copies of the object, and so are the parts of the parts, and so forth ad infinitum, is valid for the cosmos and the human being, i.e., **that human being is a miniature of cosmos.**

Imam Ali
Speaking about the formation of cosmos

It is quite strange that Imam Ali had mentioned, 1400 years ago, the theory of Big Bang and the formation of the first stage of the universe, i.e., Superfluid stage, in lively vivid detail.

He calls it water, whereas science calls it Superfluid ,i.e., fluid of zero viscosity, which is the selfsame absolute pure water.

Science points out that this stage of cosmos continued for about 300,000 years after Big Bang.

Imam Ali states that water was confined within certain boundaries, whereas science specifies it as elliptical shape, which indicates also a specified boundary within which water was confined.

Imam Ali names Big Bang as the split and fission in space, and the rip and crack in the crust[14].

He had also added a new reality about cosmos formation, i.e., the creation of space, by the expression of Lanes for Air, on which science has kept silent and is dumbfounded.

---

[14] Imam Ali's terminology is much better than that of modern science. If we assume the Creator to be on the other side, from His side He had created the split and fission in the fabric of space, and the rip and crack in the wall of the crust, whereas we on this side of the universe feel the immense gigantic impact of Big Bang – huge massive explosion and awful horrifying sound. Of course, Imam Ali is the voice of his Master – the Omnipresent Creator of the universe – whereas we (or the modern science) represent the side of the creatures.

Imam Ali had focused on that everything in cosmos - quasars, galaxies, stars, planets etc. - is in the state of rotation - everything orbiting some other thing. Holy Koran is also voicing this reality as follows:

(KORAN 21.33): All (the celestial bodies) swim along, each in its rounded course.

Imam Ali - the staunch student of Prophet Mohammed and the Holy Koran - also had cited the bewildering reality of Moving Ceiling - ceiling set in motion, propelled, impelled or driven forward. That is to say, the borderlines and frontiers of the universe are in perpetual movement. Imam had preceded Edwin Hubble by 1400 years in his discovery of the cosmic expansion.

Holy Koran also had emphasized quite clearly, 1400 years ago, on the expansion of cosmos as follows:

(KORAN: 51.47): "With power and skill did We construct the Firmament; and We are certainly expanding (it)."

What is more puzzling and bewildering is that Imam Ali had cited another cosmic reality and verity of Undulating Fabric, referring thereby to space-time undulating fabric, preceding Einstein by 1300 years.

These undulations emerge in the form of gravitation. The space-time fabric is named by Einstein in his general relativity theory, whereby he added the dimension of time to the three geometrical space dimensions, and called it a fabric, and linked the gravity force theory to it.

NASA scientists are presently hot in pursuit to discover this undulating fabric, on site, in the vicinity of black holes.

We quote excerpts from Imam Ali's speech about the formation of cosmos as below:-

"Almighty God then created the split and fission in the space, and the rip and crack in the crust. Then He created lanes for air, and let surging, rough and restless water flow into them, and torrential, profuse and superabundant floods and deluges exuberantly storming and accumulating over there.

He carried water upon the shoulders of tumultuous, stormy and gusty wind, and convulsive, rumbling and roaring thunderclaps.

He commanded the wind to pull back the flow of water, and empowered it to fasten its flowage, and confine the water to its specified borderlines.

Space under gusty wind was spacious, expanse and unstitched, and water was above stormy wind erupting, effusing, spurting and outpouring.

Then Almighty God created another wind, and tamed the origin of its flowage, and let it perpetually stir up the water, and rage and blow violently, and remotely controlled and moved the origin of the wind, and commanded it to stir upside down the torrential inundation of water, and move the waves of the seas.

The wind strongly and violently shook the water, as one would shake the water skin to condense milk into butter, and stormed and blew violently into it, as it does in empty space, pulling back the first side to its last, and the stagnant to the wavy and surging, until plenty of water was profusely swollen, and the excess substance foamed.

Then Almighty God lifted that foam to the open, spacious and expanse space; and from this scum He created the seven heavens, the lowest of which is in the form of a

wave[15], and the highest in the form of a preserved ceiling and an uplifted arch, without a column to support it, and without nails and ropes to keep its order and system.

Then He ornamented the firmament with brilliant stars, glittering[16] black holes[17], shining sun and bright moon, **all in rotating state, mobile ceiling and undulating fabric."**

But what is the story of this wavy stormy water and these torrential floods and deluges? Imam Ali had preceded the modern science by 1400 years in discovering the first stage of the formation of cosmos after Big Bang, i.e., the Superfluid stage.

The modern science asserts that at the early age of the universe there were no minerals, metals, elements of which galaxies, stars, humans, animals, plants, solids are made.

The aforesaid are all composed of molecules and atoms. It is well known that molecules are composed of atoms, whereas each atom consists of a nucleus and electrons rotating around it.

Oddly, at the early age of the universe there was neither electron nor nucleus, which is composed of proton and nitrogen elements, forget about atom itself!

---

[15] Imam Ali means that we are living in a wavy undulating world or heaven as per his expression and that coincides exactly with what Einstein says about the undulating fabric of space-time in which we live.

[16] "The bulk of the Dark Matter (in the universe) is probably associated with the (known and detectable) bright galaxies, and is known to be there," Dressler told Space.com. (See Annex 4a).

[17] The literal translation of Imam's words in original Arabic is **"glitter of piercing stars"** - or stars that pierce and make hole. The only stars that pierce and make hole in other stars and suck the matter from them, as per the modern science, are the "black holes".

Instead, there were simply very tiny infinitesimal components – very minute constituents of proton and nitrogen elements that compose a nucleus of an atom - called Quark-Gluon, which were floating freely in the form of a Superfluid of zero viscosity, or rather what modern science calls it as Quark-Gluon Soup or Plasma.

The temperature then was about **hundred trillion degrees;** and in this very high temperature it was impossible for elements like proton and nitrogen, which are the constituents of the nucleus of atoms, to surface, emerge and come into existence.

So how can atoms be there? And how can molecules, metals, minerals, elements be existent?

This stage, which was described so vividly by Imam Ali, continued for 300,000 years after Big Bang, as affirmed by NASA latest space discoveries.

All this long time – a glimpse in cosmological terms – the water was carried upon the shoulders of tumultuous, stormy and gusty wind, and convulsive, rumbling and roaring thunderclaps.

The wind had the mission and assignment to pull back the flux of water, and was empowered to fasten the water circulation and confine it within its borderlines – an elliptical shape as per modern science.

Space was spacious under the gusty wind, and water was out flowing, jetting and erupting above the stormy wind.

Imagine water strongly outpouring in this vast and expansive space, but it does not spread and disperse throughout the space, rather it remains confined within its specified boundaries, not crossing them, which as per NASA's latest discoveries was an elliptical shape.

The wind was commanded to pull it back, empowered to fasten its outflow, and confine it within its specified frontiers – as described by Imam Ali before 1400 years.

Then Almighty God created another wind, and tamed the origin of its flowage, and let it perpetually stir up the water, and rage and blow violently, and remotely controlled and moved the origin of the wind, and commanded it to stir upside down the torrential inundation of water and move the waves of the seas.

The wind strongly shook the water as one would churn it to condense milk into butter, and blew violently into it as it does in empty space, pulling back the first side to its last, and the stagnant to the wavy and surging, until huge amount of water was swollen, and the excess substance foamed.

Then almighty God lifted that scum to the open, spacious and expanse space. In the course of time, the temperature of this stormy water had decreased to one trillion degrees.

At this temperature the realm of the very tiny infinitesimal components and constituents started to disappear; that is to say, the Quark-Gluon began to say farewell to the era of their freedom in the Superfluid, and started to enter willingly into their voluntary confinement inside proton and nitrogen elements, which began to form the nucleus of the atom.

Hence the atom was born; wherefrom, molecules came into existence, and consequently the metals, minerals, elements were shaped and established.

However, the end of this very tiny infinitesimal realm and the formation of atoms, molecules, metals, minerals, elements was a very gradual process, and took a long time.

Modern science asserts that the first stars in the universe didn't contain metals, minerals, elements at all, and therefore they exploded soon and were relatively short-lived.

The epoch of Quark-Gluon Soup or Plasma – or the epoch of surging, rough and restless water, and superabundant, torrential floods as described by Imam Ali – continued for about 300,000 years.

It was followed by another epoch called Cosmic Microwave Radiations, which were much stronger than Gamma-rays.

A space observatory called MAP was successful in mapping this background in the universe, which was called Cosmic Microwave Radiation Background, and in discovering temperature fluctuations therein.

The scientists believe that it relates to 380,000 years after the birth of the universe. This background is still radiating in the universe, and will continue to radiate.

Maybe Imam Ali meant it by his words: "(He created) the highest (heaven) in the form of a preserved ceiling and an uplifted arch", because this background is extant and everlasting, despite the lapse of more than 13 billion years, whereas the Quark-Gluon Soup has completely disappeared, since the very tiny infinitesimal constituents had joined the proton and nitrogen elements for ever.

As per Annexes 59-59a-59b ("When we look in electromagnetic radiation (like light) we can only see the universe to the time when it was about 300,000 years old, because the universe was opaque to such radiation before that," Livio said.). That is to say, the Quark-Gluon Soup era is not visible because it is opaque to the electromagnetic radiation (like light).

As per Matt Crenson in his article dated June 18, 2003, in Space.com (Annexes 1 and 1a):-

"Physicists said they had created a new form of matter strongly resembling the stuff of the universe one-thousandth of a second after its birth. This matter is called Quark-Gluon Plasma and physicists believe it is the key in understanding both the dawn of the universe and the interior of atomic nuclei."

He continues: "Quark-Gluon Plasma offers a glimpse at both the birth of the universe 13 billion years ago and the incredibly tiny realm inside atomic nuclei today. Since its birth, the universe has gradually cooled from more than 100 trillion degrees to today's relatively frigid conditions. As temperatures fell below about a trillion degrees, quarks and gluons went from a free state into the confines of protons and neutrons. By reversing that process, even for only an instant, physicists hope to learn how it occurred."

He continues saying: "... was built to smash atomic nuclei so violently that their most fundamental components - quarks and gluons - are liberated from their normal tight confinement and momentarily released into a **seething hot soup**. The amount of energy required to produce that transformation is so high that it has almost certainly not existed in nature since the dawn of the universe."

For more information about Quark-Gluon please refer to annexes nos. 1 and 1a.

Koran predicting cosmic truths

At the end of the 20th century and the advent of the first decade of the 21st century, two marvelous cosmic truths were well-established in the scientific mainstream thought: Dark Matter and Dark Energy, which together constitute 96 percent of the Cosmos.

Only 4 percent is allotted to ordinary matter, from which our great cosmos is made. Very little of it can we see with our unaided eyes. Most of it may be seen or felt by virtue of advanced sophisticated appliances and devices by two ways:

- Either directly like the amazing photographs that the Hubble Telescope is supplying us with for the last two decades, and still continues to do so,
- Or indirectly like the infrared photos taken by sensors fixed on earthly as well as space telescopes, and X-ray and Gamma-ray photos, which are supplied to us by space observatories, e.g., Chandra, XMM-Newton etc.

This great cosmos that we see by the aforesaid methods is only 4 percent of the total cosmos that the humanity aspires to study in depth by launching space observatories and robots, taking photographs and analyzing elements available in cosmos.

The rest 96 percent of cosmos is invisible. Nevertheless, science has to assume them in order to account for the

cosmic phenomena that cannot stand up without them. The scientists called them "dark", since it is totally impossible to see them, because dark matter does not emit any light energy at all, and dark energy is like gravity force that cannot be seen but its effect can be felt.

However, Holy Koran had mentioned them 1400 years ago as follows:

> Koran: 81.15: "Verily I call to witness what are invisible that recede.
> 81.16: (Verily I call to witness) hidden flowing (forces) that sweep".[18]

It is self-evident from the literal translation that the verse 15 refers to Dark Matter, and verse 16 to Dark Energy, both great cosmic truths, which Almighty God has called to witness.

The conventional interpreters believed they are all the planets, and some restricted them to Saturn, Jupiter, Mars, Venus and Mercury.

The literal translation is clear and the word "invisible that recede" denotes Dark Matter more than planets, and the word "flowing that sweep" denotes Dark Energy more than planets.

The Koran interpreters knew nothing about these great cosmic truths, which were definitely proved to exist just recently, at the end of the 20th century and beginning of the 21st century.

They were relying on their unaided eyes that could not see many of the planets, and therefore called them invisible.

---

[18] The conventional translation is as follows: "Verily I call to witness the Planets that recede, go straight, or hide". But the literal translation is what I have stated above, taking into consideration that they are two verses and not one.

But they are certainly not invisible in front of great scientific progress, giant telescopes and space observatories that presently observe them.

Since we know that Holy Koran is for all times and all places, it is advisable now to stick to literal translations and to be more honest and specific, and abandon mixing our wrong understanding with the translation of this great book full of facts and truths.

It is imperative now to interpret "hidden flowing (forces) that sweep" for Dark Energy, and "invisible that recede" for Dark Matter, which is really invisible even to the most sophisticated devices and apparatus of our time.

The Holy Koran expresses Dark Energy which is a great cosmic truth by "hidden flowing that sweep". It is a force that flows in the universe like fast precipitating river.

One meaning of it is "hidden", and traditional Koran interpreters believed they are angels or stars, since they appear at nights and disappear at days. In fact, it is applicable to Dark Energy more than angels or stars.

The Koran interpreters knew nothing about this great Cosmic truth which was finally evidenced at the advent of the first decade of the 21st century.

Verily the planets and stars are not invisible to human eyes, as it was imagined before. It is correct that they are invisible to unaided eyes, but not to present sophisticated telescopes and devices situated in the outer space, or to future telescopes, sensors or other appliances which scientists are hot in pursuit to discover and invent.

It is well-known that planets and stars are made of normal matter that emits the light energy, or electromagnetic rays

at large, which interact with human devices. The more complex the devices are the more conspicuous is their interaction.

Some of the normal matter that emits light energy could be seen by human eyes. But electromagnetic rays are available in different wave lengths, the longest are radio waves, little shorter are the infrared rays (from one to hundred microns), and still shorter are the light rays seen by human eyes (from 400 to 700 nanometers), the ultraviolet rays, X-rays and Gamma-rays, which are the shortest wave length, but strongest in energy.

As for Dark Matter, it does not emit energy enough to enable one to see it directly, neither by human eyes nor by sophisticated appliances. Nevertheless its existence is noticed indirectly.

In other words, Dark Matter does not interact with human devices and therefore cannot be felt around by most progressed appliances however complex are they.

Most important is that these great cosmic truths, which Almighty calls to witness, were cited in the context of a Holy Sura (No. 81) in Koran that depicts quite vividly the massive events relating to the end of the world. I quote below this short Sura:

"When the Sun (with its spacious light) is folded up; when the stars fall, losing their luster; when the mountains vanish (like a mirage); when the she-camels, ten months with young, are left untended; when the wild beasts are herded together (in human habitations); when the oceans boil over with a swell; when the souls are sorted out (being joined, like with like); when the female (infant) buried alive is questioned – for what crime she was killed; when the Scrolls are laid open; when the World on High is unveiled;

when the Blazing Fire is kindled to fierce heat; and when the Garden is brought near; - (then) shall each soul know what it has put forward.

Verily I call to witness what are invisible that recede, hidden flowing (forces) that sweep; and the Night as it dissipates; and the Dawn as it breathes away the darkness; - Verily this is the word of a most honorable Messenger, endued with Power, with rank before the Lord of the Throne, with authority there, (and) faithful to his trust.

And (O! people) your companion is not one possessed; and without doubt he saw him in the clear horizon. Neither doth he withhold grudgingly knowledge of the Unseen. Nor is it the word of an evil spirit accursed. Then whither go ye? Verily this is no less than a Message to (all) the Worlds; (with profit) to whoever among you wills to go straight; but ye shall not will except as God wills, - the Cherisher of the Worlds."

The verse 16 about "hidden flowing (forces) that sweep" clearly gives the meaning of "sweeping", in addition to "hidden".

That is to say, this force is sweeping throughout the universe: sweeps these very remote, titanic, mammoth and gigantic galaxies and quasars away from each other. This cosmic phenomenon is called "cosmic expansion" that takes place not at constant rate, but at accelerated rate, which will eventually conduce to the end of this world, as the Holy Sura is depicting its massive events.

In my opinion, it will be the end of this world only, and then the creation will repeat itself into quite new world, since Almighty God originates creation and then repeats it, as expressed by Holy Koran 1400 years ago:

Koran 29.19: "See they not how God originates creation, then repeats it: truly that is easy for God."

As for the cosmic expansion, Holy Koran has preceded the modern science by 1400 years in expressing this great Cosmic truth as follows:

Koran 51.47: With power and skill did We construct the Firmament, and We are certainly expanding (it).[19]

It is clear that the stress sign of (ـّ) in Arabic language indicates not only expansion but rather accelerated one.

Is it not more appropriate to address the advanced world, which has discovered great truths like Big Bang, Gravitation, Relativity, Cosmic Expansion, Dark Matter, and last but not least the Dark Energy, and has brought us colored photographs of very gigantic galaxies and Quasars - 12 billion light years away - instead of restricting our address to the dead worlds of the past?

Whereas our Holy Koran is perpetually alive, addressing this advanced world and the great extents it has reached and the great achievements it has accomplished.

Don't you know that Holy Koran is for all times and all places? But where are we from these great cosmic truths, like dark matter and dark energy to which the today's advanced world has reached, whereas Koran had preceded it by 1400 years?

As you read in an earlier chapter, Imam Ali who is just a disciple of the prophet Mohammed, rather his slave as he has described himself, has preceded the modern science in discovering Big Bang, the first stage of the formation

[19] The conventional translation is: "With power and skill did We construct the Firmament; for it is We Who create the vastness of Space". But the literal translation is what we have stated above.

of universe, i.e., Super-fluid stage, cosmic expansion, undulating space-time fabric, etc.

He has described Big Bang so vividly! He has cited the "moving ceiling" so clearly expressing thereby the cosmic frontlines perpetually expanding (or contracting)[20] and not remaining stable!

He has mentioned the "Undulating Fabric" in his lecture, expressing thereby the undulating space-time fabric, the undulations of which appear in the forms of gravity. It is the same fabric that Einstein has stated in his general relativity, when he had added the dimension of time to the three geometrical dimensions, calling the space-time a fabric and linking it to gravitation theory.

Imam Ali had proclaimed this cosmic truth 1400 years ago, whereas Einstein had propagated it only 100 years ago.

Imam Ali had also described very vividly the formation of the first stage of the universe, i.e., the Super-Fluid stage. He described it as "water", whereas science puts it as "super-fluid", a fluid of zero viscosity, which is the same water of perfect purity. Science points out that this stage of the formation of the universe had continued for about 300,000 years after Big Bang.

Imam Ali had stressed that water was confined within certain borderlines that water was not allowed to cross, whereas Science defines it as an elliptical shape, which is also certain frontlines that water was not allowed to traverse.

Imam Ali had voiced the Big Bang saying:

---

[20] Science says that universe was expanding after Big Bang, but at decelerated rate, in the first 6.3 billion years of its formation. Before 6.3 billion years it has reversed from deceleration to acceleration. Anyhow, the ceiling was never stable, but always moving.

"Almighty God then created the split and fission in the space, and the rip and crack in the crust."

Adding to it the creation of Space by saying:-

"Then He created lanes for air."

Imam Ali had emphasized that everything in this wonderful universe e.g. quasars, galaxies, stars, planets, etc., are all rotating by saying:

"Then He ornamented the firmament with brilliant stars, glittering[21] black holes[22], shining sun and bright moon, **all in rotating state, mobile ceiling and undulating fabric.**"

Holy Koran has referred to this great cosmic truth more in detail in two Suras and two verses as follows:

Koran: 21.33: "All (the celestial bodies) swim along, each in its rounded course."
Koran: 36.40: "Each (just) swims along in (its own) orbit."

Imam Ali had uttered three great cosmic properties 1400 years ago as follows:

"All in rotating state, mobile ceiling and undulating fabric."

The property of "rotation" was well-known in the olden times, except for Earth, which most of the ancient scientists believed was the stable center of the universe.

The second property of the "mobile ceiling" of the universe i.e. that the borderlines of the universe are not stable, but

---

[21] "The bulk of the Dark Matter (in the universe) is probably associated with the (known and detectable) bright galaxies, and is known to be there," Dressler told Space.com. (See Annex 4a).

[22] The literal translation is glitter of piercing stars, or stars that make hole.

perpetually moving, was discovered in the twenties of the 20th century by Edwin Hubble, and completed by NASA astronomers, who discovered it in 1997 and declared it in 1998 saying that the cosmic expansion is accelerating.

The third property of "Undulating Fabric" was theoretically suggested by Einstein at the advent of the 20th century; but on practical level NASA scientists are now hot in pursuit to view this great cosmic phenomenon – on the site - around the black holes outside the "event horizon".

Imam Ali had declared all these great cosmic realities in fluency and eloquence unparalleled in Arab culture, except in Holy Koran and his Master the prophet Mohammed's eternal sayings. Not everybody can taste it and appreciate it except those scholars excelling in Arabic language.

More important is the fact that Holy Koran had specified details about the Relativity Theory, as will be cited by us in a later chapter, data which when entered in Relativity equations bring forth the same results to which Einstein had arrived, taking into consideration that Holy Koran had voiced these great facts 1400 years ago.

Does this look strange?

If so, then it should equally be strange to know that our ancestors in Iraq were the first to invent Writing, Mathematics, Algebra, Trigonometry, Astronomy, etc.

Does this look strange also?

I don't know when will we get rid of psychological complexes in front of West? Unfortunately, our Intelligentsia has been afflicted with these complexes, the same intellectuals who were representing our hope to declare these great cosmic truths in which we have preceded the West by 1400 years.

But unfortunately, this Intelligentsia is overpowered by Western Culture, and has forgotten his Oriental Roots, and has looted from us our good features, and attached our merits to the West.

Unfortunately, most of us still continue to insist on petrified black thoughts and attribute them to Holy Koran, whereas they say – just by tongue of course – that Koran is for all times and all places. What huge difference between what they say and what they actually think!

How many are those who have turned their backs to Koran and have petrified this Great Book, because they themselves are concrete petrified minds!

I just cite what our great religious leaders have said, and where are we from their lines of thinking!

Imam Zein-Ol-Abideen had said that "Sura Towhid" contains very great secrets that **will be discovered in future.**

Imam Sadiq in his dialogue with Jabir Bin Hayyan had mentioned that the tools by which the universe was created **will be discovered in future.** He had said:

"Tell him that our mind and senses are imperfect and insufficient to comprehend the tools and instruments by which the world (or life) is created. Nevertheless, we do see with our eyes the materials from which the world is created. **In order to apprehend the tools and instruments by which the world (or life) is made, we must have a mind stronger than what we have now, and senses other than what we have now."**

In another place during the debate, Jabir Bin Hayyan asked him:

"Do we expect an era coming **in the future**, when we would be capable of conceiving the tools and instruments by which the world (or life) was created?"

Imam Sadiq responded:

"Yes, oh! Jabir. Science has cycles of rise and fall as emphasized to us by history. It is possible that **in future** we have scientific boom and progress, when humanity will realize the tools by which the world (or life) is created."

Our religious leaders are so knowledgeable and aware that **they refer us to future**, whereas we read Holy Koran with the eyes of the dead, and what our ancestors had said in past ages, in full disregard of the latest human discoveries unprecedented in history. Then we say – of course by tongue only – that Koran is for all times and all places.

Imam Sadiq had given clear indication that **in future our minds will be stronger than what they were then, and our senses quite different from what they were then.**

Imam Zein-Ol-Abideen had also tacitly given us the impression that **the secrets of Koran will be conceived by the men of future.**

Then when we utter the great facts hidden in Koran, they get amazed! As if we have brought along this facts from Mars! Men of reason can easily find these facts when they stick to the literal translation. We have become so unaware of Holy Koran that if we translate also, we reveal our poor understanding of this Great Book.

Or maybe what Sheikh Mohammed Abdo had said after his return from France at the end of the 19th century is quite correct, that in the West there is Islam but no Moslems, whereas in the East there are Moslems but no Islam. This

shows why the Moslem Civilization today has fallen back, because Moslems themselves are quite aloof from the enlightened content of Holy Koran.

The clearest evidence is that when the western philosophers and thinkers convert to Islam, they have so strong faith that they focus on the innermost gist of Islam, like Prayers and spiritual meditation - or what we call the presence of heart or transcendence in Islamic prayers - and they adopt the deep enlightened cognition of Islam, instead of shallow traditional understanding of Islam, whereas the enlightened cognition is disdained and slighted by Muslims around us.

For example, French thinker Dr. Michel Pertron, who has recently adopted Islam describes the causes for adopting Islam, and why he turned away from Christianity as follows:

"The problem in Christianity is to conciliate between meditation and worship of God and our natural daily life, which we should live in this world.

It is natural that a man should marry, bring forth children, have a normal family life and fulfill his family and social commitments. Therefore, he cannot live life of meditation because of his worldly preoccupations.

Subsequently, there emerges a big difference between those committed to religious life and those practicing normal day-to-day practical life. This contrast really harassed me much and caused me many problems and difficulties."

And he speaks about Prayers in Islam as follows:

"What touched me most is the huge power of the prayers. Islamic prayers have a great power ......

The power of Islamic prayers initially originates from the holy language used in the prayers; namely Arabic which is the language of Divine Revelation, and which has a great impact upon me.

I may also affirm the fact that it has an effect upon my body as well. When the time of the prayers arrives, I feel something spiritual descends upon my person like a deep sound summoning me to prayers.

I don't feel at all that it is a compulsory thing imposed and coerced upon me. Rather I feel it is an obligatory assignment and an act of submission to God, and a voluntary task and a freewill obedience of God.

I don't feel at all that it is a forcible duty enjoined upon me from without. In this lies the spiritual power of the Islamic prayers .....

What I have accomplished from my adoption of Islam and during my Islamic experience is my conviction that I am on the right path. Consequently, my life perusal had different direction in the light of this rightness. I came back to read my life in a different way.

Whatever appeared to me in Islam before as compulsory obligations which looked difficult to practice, became now all at a sudden an absolute necessity for those who obey and love God, and for those who seek to be slave of God, in full obedience to Divine Revelation, revealed by God to his prophet Mohammed .....

I can say that real Christians now are Muslims, since they are applying what Jesus has demanded from them; namely, attachments and brotherhood between each other.

This is deeply moving and thrilling to notice how much I am loved by brethren, who consider me as one of them;

although I am a stranger to them. This feeling of ease and security and love is a great thing indeed.

In general, Islam has changed everything in my life, e.g., my suspicions have transformed to certainty and assurance, and I have revised my life in the light of this conviction.

It is worthwhile to mention that revelations of Koran have become facts and realities for me, which I was previously suspecting, and around which I was posing quite a lot of questions.

Consequently, what seemed to me in the past as imposed teachings and commands, are considered by me, after I adopted Islam, as religious duties, divine precepts, surrender to God and holy relations with men of will and strong faith in God, preoccupied in good deeds that God expects of us.

In the past I was refusing them, because they appeared to me as dictations.

Therefore prayers and Islamic commands appear to me now as my own personal needs and necessities, and not as coercive actions .....

I can say that an unknown power was urging me forward strongly to visit holy places in Damascus, which was not in my agenda at all, particularly the last place that I visited; namely, the mosque of Sheikh Mohieddin Bin Arabi, where lies his tomb ......

Yes, I have read the books of Sheikh Mohieddin Bin Arabi; particularly, books translated to French by some Muslims and especially Michel Shotcofix, and also other authors who are brilliant translators, and are well aware of Islam.

I have found in his books great values, enormous spiritual powers, exceptional and extraordinary convincing force, deep faith, submission to God and evidence of His rightness and authenticity.

As far as my feeling is concerned, when I reached the mosque I tried to pray in the vicinity of his tomb, and stayed for about half an hour pondering and contemplating God, entreating Him to help me, not knowing how. Yet I implored His help and knowledge, and then I entered the room, where his grave lay.

I do hereby assert the fact that I visited the tomb of Sheikh Bin Arabi, because of my high esteem for him. I just wanted to express my appreciation and exaltation for this spiritual master, although I didn't know why I visit his tomb; nevertheless, I believed that it is the means by which I do express my gratitude to him for his great works, which I have loved so much ......

In conclusion, I have a word to say to a true seeker of truth: Step forward to God and seek Him with true and sound heart, even if you are desperate; even if you are in doubt and suspicion; and even if you are overwhelmed by worry, concern, anxiety, disturbance and confusion. Be sure God will step forward towards you, manifest to you His Face, and change your heart, in order to set you up in peace and happiness, just like me ever since I have adopted Islam."

There is also another example of the new converts to Islam. He is the French philosopher Roji Garodi, who not only converted to Islam, but also joined the great reformers of Islam, like Mohammed Iqbal Lahori, Akber the great – the Emperor of India – Ibn Arabi, Al-Bironi, etc.

He appeals for reforms in today's Islam. As if the today's Islam is different from the Islam of Mohammed!

Koran 3.144: "Mohammad is no more than an Apostle; many were the Apostles that passed away before him. If he dies or is slain, ye will then turn back on your heels; if any did turn back on his heels, not the least harm will he do to God; and God will reward those who are grateful to Him."

I don't know how many in this world are the "Grateful to God", but Almighty God has said that the "Grateful to God" are few:

Koran 34.13: "But few of My servants are grateful."

Just note what Roji Garodi, the author of a book called "Islam Religion of Future", says:

"Of course, now I have more faith in all that I have said and written, and I insist that all the Muslims should struggle and strive hard, and wield knowledge and awareness, in order to arrive at proper application of Islamic principles.

I don't hide faith inside my pocket, and I do not conceal it in my handkerchief. It is a process of interaction and perseverance. One should not pretend to have reached the termination. You have to strive and struggle daily to reach perfection and beyond, until it is possible to approach a global Islamic civilization, by will of God, or a global civilization based on Islam .....

The problem of the future of Islam may be revealed in simple words as follows:

1 - Either Muslims should look at the future with the eyes of the past, relying on the interpretations relating to the eras of Omayyid and Abbasid dynasties, which were based on legal problems of those olden times.

2 - Or they should be able to solve the problem of a new pattern of development, in order that Islam should resume its victorious flight, as happened in the first Hijri century, when the Muslims offered solutions for all the problems, originating from the downfall of Bezentium and Persian empires.

There is nothing more absurd and more contradictory to dynamic global vision than naïve belief that all the past and future problems are solved, and it suffices to memorize the past versions and texts to fulfill all the present requirements, cover all the present developments and answer all the present questions.

Such a sufficiency is contradictory to religion. It prevents thousands of people to delve into the ignorance and disintegration of the collapsing western civilization, see its far-reaching decay and decomposition, and find out that it is possible for the Holy Code of God, who is the Only Possessor, the Only Predominant, the Only Learned, to endow them with all high values, and pull them out from the law of jungle, from the law of power and from the law of mess and anarchy.

On the other hand, if one mixes up this Holy Code of Quintessence with human interpretations of bygone centuries, this would conduce certainly to isolation of Islam.

It is only through the enforcement of the gist of the Holy Code, that Islam can find better opportunities for worldwide spread in this century than what happened in the first Hijri century .....

In my opinion, renovation of Islam or rather future of Islam depends on numerous factors, the major points of which are the following:

1 – Hot pursuit by Muslims to revise and revive once again all the dimensions, which were made in ancient times, for the sake of magnificent spread of Islam and its glorious global penetration, which was not restricted to traditions and customs prevalent in near east or its past; rather, it was open to all cultures, and acknowledged the great solidarity between monotheistic religions of the east and west and wisdom of remote countries like Persia, India and China.

2 – The great intrinsic dimensions of Islam itself and its love for others. The great Sufis of Andalus, e.g., Bin Masarrah and Bin Arabi, defended the deep-rooted and steadfast values of Islam. Likewise, Birooni and Emperor Akber, during the zenith of Islamic glory in India, defended these supreme values against inherited religious rituals, and external dead frozen religious configurations.

3 – The vast social factors inherent in Islam, repulsing law of jungle, shunning utilitarian quarrels, alienating accumulated wealth in the hands of individuals, and hating misery and wretchedness for other people.

4 – The intrinsic potentials within Islam itself for criticism of clergymen preoccupied with absurdities, who make themselves guardians of fanaticism, and consider themselves representatives of God .....

The poet Mohammed Iqbal Lahori has proved in his book "Restructure of religious thought in Islam" that positive self-criticism in Islam has preserved Islam from its ailments and sufferings against those who read Holy Koran with the eyes of the dead; that is to say, repetition of what ancestors had said during the first few Hijri centuries, who had their own views and ideas about solving the problems, that they had confronted in their own epochs.

But those problems relating to their times are not our problems of our time. Therefore, adopting their interpretations and counting on their solutions is a treachery against Holy Koran itself.

Almighty God who never ceases to create, and who has breathed into the Human from his own soul to become His successor on Earth, who invites him without halt and appeals to us without cessation to contemplate His everlasting rejuvenated signs and masterpieces in His perpetual eternal Creation, is taking distance from those people who seek to go back to the past.

Such people are eaters of ashes, who by their persistence to embalm the living Islam, offer big benefits to the enemies of the Islamic Doctrine, and who are an obstacle in the face of modernization - not whatsoever on the pattern of western modernization, which is declining, decaying and deteriorating.

Such Muslims prevent and hinder Islam from being on the frontline together with the faithful people of the world, who love the future, especially those who love revival of the world."

Relativity theory and speed of light in Islam

➧*Speed of Light in vacuum at 299792.5 km/s*

299,792.458 km/s is the speed of light in vacuum. But 1400 years ago it was stated in the Quran (the book of Islam) that angels travel in one day the same distance that the moon travels in 1000 lunar years, that is, 12000 Lunar Orbits / Earth Day. Today we know that if we remove the Earth-moon system from the gravitational field of the sun all observers will see the speed of light outside gravitational fields to be equivalent to 12000 Lunar Orbits / Earth Day.[23]

Moslems believe that angels are low density creatures, and that God created them originally from light. They **move at any speed from zero up to the speed of light.** It is the angels who carry out God's orders. Those angels take their orders from a Preserved Tablet somewhere in outer space and not from God's Throne. They commute to and from this Preserved Tablet to get their orders from God. In the following verse, the Quran is describing how angels travel when they commute to and from this Tablet. And the speed at which they commute to and from this Tablet turned out to be the known speed of light:

[Quran 32.5] (Allah) Rules the cosmic affair from the heavens to the Earth. Then this affair travels to Him a distance in one day, at a measure of one thousand years of what you count.

---

23 Thanks to some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously.

It is the angels who carryout these orders (see why Arabic wording refers to distance at footnote [1])[24]. Hence in one day, the angels will travel a distance of 1000 years of what they counted. Those people back then followed the lunar calendar and counted 12 lunar months each year. These months are related to the Moon and **not related to the Sun.** Since this verse is referring to distance, then Allah is saying that angels travel in one day the same distance that the moon travels in 12000 lunar orbits. Outside gravitational fields this speed turned out to be the known speed of light (the Preserved Tablet is outside gravitational fields):
The Earth-Moon system covers an angle ø around the Sun each cycle (sidereal lunar month). Without the gravitational field of the Sun, the lunar orbit cannot change direction but rather floats in a straight path to distant stars. But due to the gravitational field of the sun, the lunar obit is changing direction every cycle by this angle ø with respect to distant stars.

---

[24] [Footnote 1] The Arabic word *"Araj"* means a man with a lame leg. In this verse, the Quran specifically uses it's verb *"Yaruj"* which simply means a man walking on a lame leg. The Quran is describing the speed at which His orders (*amr*) are carried out and literally says that it is "at a measure (*mekdar*) of one thousand years of what you count". This verse is emphasizing the lame steps and describing something quantitative; so what is quantitative about walking? Time and distance. Time is defined at one day and the other quantitative thing is 1000 years of what they counted. So the other quantitative thing has to be distance, not time. So the orders are carried out at a rate equal to this distance over this time.

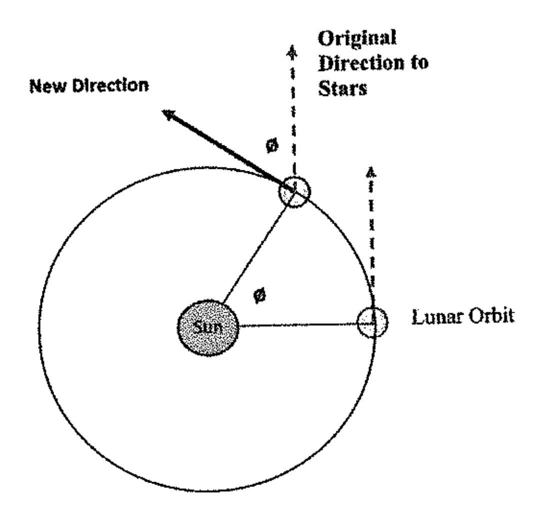
About this Preserved Tablet:

> [Quran 85.21-22] But it is a Glorious Quran. [22] Inscribed on a Preserved Tablet.

Moslems believe that Archangel Gabriel got the Quran to their Prophet from this Preserved Tablet:

> [Quran 15.8-11] We only send down the angels in Truth; if they were not (in truth), no respite would they have.[9] We have sent down the Message; and We will preserve it. [10] We did send Messengers before you among the religious sects of the old.[11] But never came a Messenger to them but they mocked him.

The Quran and all the instructions to all angels are inscribed on this Preserved Tablet. The angels were originally made of light, and the speed at which they commute to and from this Tablet turned out to be the known speed of light.



The lunar orbit changes direction with respect to stars by the same angle it orbits the Sun.

Every point in this orbit has a certain magnitude and a certain direction. As the Moon heads to the Sun it speeds up, and as it heads away from the Sun it slows down. This creates a sector of the orbit where the moon is speeding up. But as the Earth goes around the Sun, the position of the Sun relative to Earth with respect to stars is changing. **This makes the sector where the moon is speeding up move forward inside the orbit such that it points to the Sun again; similarly the sector where the moon is slowing down moves forward inside the orbit such that it points away from the Sun again. Hence, the entire orbit changes direction with respect to stars by the same angle it orbits the Sun (twist). This means that the orbit is influenced by a net rotational force (like torque around Earth).** As the distance to the Sun increases to infinity, ø decreases to zero and this force decreases to zero. When we vectorially remove the energy gained from this force we can calculate the total energy and hence the length of the lunar orbit outside gravitational fields.

Time:

This table below shows the lunar month and the Earth day in both sidereal system (with respect to stars) and synodic (with respect to Sun):

Period	Synodic (sun)	Sidereal (stars)
Earth day t	24 hours = 86400 sec	23 h 56 min 4.0906 sec = 86164.0906 sec
Lunar Month T	29.53059 days	27.321661 days = 655.71986 hours

NASA uses the sidereal system (with respect to stars) for defining the lunar orbit, lunar month (T), the Earth day (t′) and for calculating the velocity of the Moon. Similarly, Moslems use the sidereal system (with respect to stars) in their proof: For the Earth-Moon system to be outside gravitational fields then the distance to the sun has to increase. And as the distance to the Sun increases, the Sun becomes just another star; that is the synodic lunar month becomes equal to the sidereal lunar month, the synodic day becomes equal to the sidereal day.

Distance:

So the formula as proposed by Allah is:
Distance traveled by angels in one day = 12000 x Distance traveled by moon during one orbit
□ C t′ = 12000 L′
Where:

C	Is the speed of angels, which we intend to calculate and then compare to the known speed of light (no external forces, no acceleration, no deceleration).
t′	Is the Earth Day defined as the time of one rotation of the Earth about its axis with respect to stars (sidereal) i.e. 23 hr, 56 min, 4.0906 sec = 86164.0906sec.
L′	Is the length of the lunar orbit outside gravitational fields (no external forces, no acceleration, no deceleration).

Length of Lunar Orbit:

Length of lunar orbit = Velocity x Time (L = V T)

The velocity of the moon is not constant. NASA measured the spontaneous velocity of the moon at various instances throughout its orbit. These measurements show that the velocity of the Moon varies considerably (from 3470 km/hr up to 3873 km/hr); which means that the Moon accelerates and then decelerates continuously. The average lunar velocity is V_{avg} = 3682 km/hr.

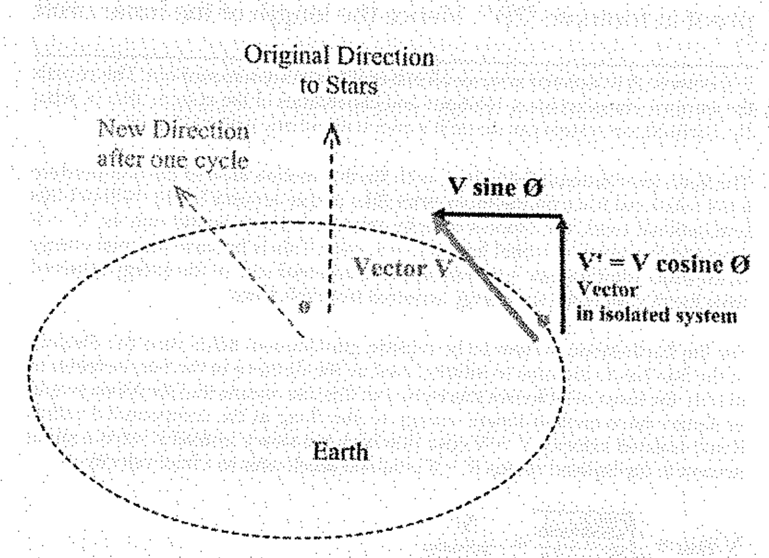
The lunar orbit relative to Earth is an ellipse; but most astronomy textbooks calculate the length of the lunar orbit manually by the following equivalent circle method: The average orbital radius is R = 384267 km, so the length (L) of this elliptical orbit relative to Earth is:

$$L = 2\pi R$$
$$V = L / T \quad \square \quad V = 2\pi R / T$$

Substituting R = 384267 km and T = sidereal lunar month = 655.71986 hr:

$$V = (2 \times 3.141593 \times 384267) / 655.71986 = 3682.092 \text{ km/hr}$$

Although this velocity is correct relative to Earth, this velocity is under the influence of the gravitational pull of the Sun. We can vectorially calculate the velocity of the Moon relative to Earth without the gravitational pull of the sun: Since the Earth and the Moon orbit the Sun together, then the velocity vector of the entire orbit around Earth has to have the same direction as the direction of Earth around the Sun at the end of each cycle (otherwise they will diverge):



Components of compounded vector V = vector in the isolated Earth-Moon system **(Vcosø)** plus vector acquired from the gravitational field of the Sun **(Vsineø)**

In the isolated Earth-Moon system (no Sun), the moon's isolated vector remains in the original direction with respect to stars (no twist); but in the compounded system, Moon's compounded vector changes direction by angle ø with respect to stars each cycle around Earth (twist). This means that the energy for the Moon's velocity (V) is the vectorial sum of the intrinsic energy of Earth-Moon system (kinetic energy of Earth's spin transferred to lunar orbit by ocean friction; see how below) plus the energy acquired from the gravitational field of the Sun.

As the distance to the Sun increases to infinity the lunar orbit looses this twist; but without the energy gained from this twist the orbital radius decreases to R′ = R cosø (see

proof at footnote [2])[25]. Hence the length of the lunar orbit

---

[25] [Footnote 2] In isolated systems all external forces are screened out. This reveals the intrinsic characteristics, relations and capabilities of the system, that is, what the Earth-Moon system can do on it's own without any external forces.

The Sun's gravitational field along with Earth's motion around the Sun produce a net rotational force on the lunar orbit (like torque around Earth). Without this gravitational twist, the Moon's velocity relative to Earth would only be V' = V cosø and the isolated orbital length L' = L cosø. This is because the total energy of the lunar orbit (kinetic + potential) is the vectorial sum of the energy acquired from Earth's spin plus the energy acquired from this force.

For the Earth-Moon system to be outside gravitational fields then the distance to the Sun has to increase to infinity. And as the distance to the Sun increases to infinity the lunar orbit looses this twist; but this also means that the Moon would no longer have enough kinetic energy to stay long at the compounded radius R and isolated velocity V' = V cosø (too high too slow), instead it starts a spiral descent to the isolated radius R' = R cosø and accelerates to a final velocity of

$$V'_{Final} = \sqrt{\frac{GM_{Earth}}{R\cos\phi}} = \frac{V}{\sqrt{\cos\phi}}$$

The ratio of the orbital binding energies (the ratio of the work required to move the Moon against gravity to infinity) is:

$$\frac{W_{R\to\infty}}{W_{R'\to\infty}} = \frac{-(EK(R)+EP(R))}{-(EK(R')+EP(R'))} = \frac{\frac{1}{2}m_{moon}V^2 - \frac{Gm_{moon}M_{earth}}{R}}{\frac{1}{2}m_{moon}\frac{V^2}{\cos\phi} - \frac{Gm_{moon}M_{earth}}{R\cos\phi}}$$

$$= \frac{\frac{1}{2}m\frac{GM}{R} - \frac{GmM}{R}}{\frac{1}{2}m\frac{GM}{R\cos\phi} - \frac{GmM}{R\cos\phi}} = \frac{-\frac{GmM}{2R}}{-\frac{GmM}{2R\cos\phi}} = \cos\phi$$

This means that without the energy gained from this twist the orbital radius decreases to R' = R cosø. Hence the length of the lunar orbit becomes L' = 2πR' = 2πRcosø = Lcosø (i.e. 12000 L' / t' = 12000 Lcosø / t') and the orbital period decreases.

Simply put: If you remove the Earth-Moon system from the gravitational field of the Sun all observers will see the speed of light outside gravitational fields to be equivalent to 12000 Lunar Orbits/ Earth Day.

The energy for this isolated velocity V' came from a reaction force from Earth (see ocean friction above) and not from Sun's gravity. As the moon acquires more energy from Earth's spin it does not actually speed up, instead it slows down because it orbits at a higher altitude (R' increases); the orbital period increases and the length of the lunar orbit increases. As R' reaches R, the isolated lunar orbit would have acquired the same radius and velocity as the one achieved with the assistance of the sun (R' = R & V' = V) but with a slower rotating Earth.

becomes **$L' = 2\pi R' = 2\pi R\cos\phi = L\cos\phi$** (i.e. $12000\ L' / t' = 12000\ L\cos\phi / t'$).

Speed of Angels:

So finally we can calculate the speed of angels in vacuum and compare it to the known speed of light in vacuum 299792.458 km/s:

$$C\,t' = 12000\ L'$$
And $L' = L\cos\phi = V\,T\cos\phi$
$$C\,t' = 12000\ V\,T\cos\phi$$
$$C = (12000\ V\,T\cos\phi) / t'$$

Substituting the NASA sidereal values of the periods T and t′ (from above table); ø is 26.9295 degrees and could be manually calculated at this footnote [3][26]; cosø = 0.8915645, we arrive at the velocity of angels as claimed in the Koran:

$$C = (12000 \times 3682.092 \times 655.71986 \times 0.8915645) / 86164.0906$$

C = 299792.5 km/s

Exactly the known speed of light!!!

It is not a surprise that the speed of light and the core of the Special Relativity Theory are existent in Holy Koran by exact figures and meticulous details, since it is not a man-made book but the word of Almighty God revealed to His Prophet Mohammed.

---

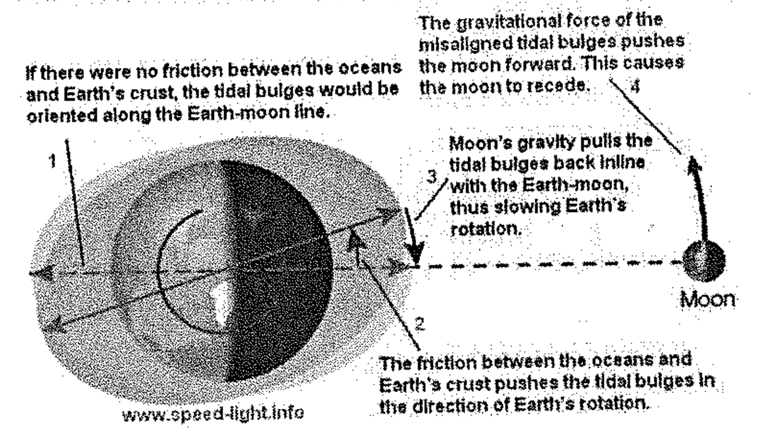
[26] [3] The entire lunar orbit changes direction with respect to stars by the same angle it orbits the Sun. Since these two angles are equal, we can simply calculate the angle around the Sun (because it is easier) and then use it in the other. We can calculate ø from the period of one heliocentric revolution of the Earth-Moon system (365.2421987 days):

$$\phi = 27.32166088 \text{ days} \times 360 \text{ degrees} / 365.2421987 \text{ days} = 26.92952225 \text{ degrees}$$

If you remove the Earth-moon system from the gravitational field of the sun, all observers will see the speed of light outside gravitational fields to be equivalent to 12000 Lunar Orbits/ Earth Day.

Ocean Friction

re shows you how ocean friction transfers the kinetic energy of Earth's spin to the lunar orbit:



Ocean friction is causing the rotation of Earth to slow down, that is, for the days to get longer (t′ increases). And as Earth's rotation slows down the moon recedes (R′ increases). For the Moon to orbit Earth with the same velocity and altitude but without any assistance from the sun, it needs to acquire even more energy from Earth's spin; that is t′ has to increase until R′ = R.

$$c = 12000\ \mathbf{L'} / \mathbf{t'} = 12000\ 2\ \pi\ \mathbf{R'} / \mathbf{t'}$$

Both R′ and t′ is increasing but due to a fundamental law in astrophysics the ratio **R′ / t′** remains the same: The tidal force decelerating Earth is the same force pushing the Moon. Since the force pushing the Moon is gravitational

then it is inversely proportional to the square of the distance to the Moon. Similarly, this same force decelerating Earth is proportional to the change in kinetic energy in Earth's spin, that is, it is inversely proportional to the square of Earth day. This makes the square of the distance to the Moon to be directly proportional to the square of Earth day. This implies that the distance to the Moon remains proportional to Earth day. Hence **R′ / t′** is a constant equal to 3.976120966 (R′ / t′ = R cosø / t′). This makes the equation in the Koran **c = 12000 L′ / t′ to be composed only of constants,** with no variables. Hence, **12000 Lunar Orbits/ Earth Day is a constant forever.**

4.5 billion years ago the moon formed when a planet collided with Earth. On impact, Earth gained angular momentum (rotational speed). This angular momentum has been slowly transferring to the lunar orbit. On impact of that planet with Earth, the molten debris recoiled with a certain escape velocity and sucked vaporized water and some gases from Earth's atmosphere. This debris clustered to form the Moon. But the Moon couldn't maintain those gases because it's gravity was extremely weak; so it lost those gases along with some debris (about 17 percent of its initial mass) and settled in orbit without this mass.

The equation in the Koran **c = 12000 Lunar Orbits/ Earth Day** has been true in the isolated system ever since the Moon first lost this mass, that is, since the early creation of the Earth-Moon; is true today and as the moon continues to recede this equation in the Koran will always be true. Thanks to Dr. M. Doudah: Preserved dynamics of Earth-Moon since system birth.

299,792.458 km/s is the speed of light for observers standing outside gravitational fields and looking at light also traveling outside gravitational fields. But an observer near a black hole for example sees the speed of light

outside gravitational fields a zillion km/s. **This is because the velocity of light appears to vary with the intensity of the gravitational field** (See proof at footnote [4])[27].

According to the theory of General Relativity an observer standing outside gravitational fields (in vacuum) looks at events inside gravitational fields and sees them in slow motion. When he steps inside those gravitational fields he sees them in normal speeds. But now he looks back at where he was outside gravitational fields and sees the events there in fast motion. In our case the event is the Moon orbiting Earth. When an observer in stronger gravitational fields, near a black hole, for example, looks at the Earth-Moon system, he does not see the Moon orbiting Earth once every month; **instead he sees the Moon orbiting Earth once every few seconds**; he also sees the length of the lunar orbit to be much longer than we see it.

Not only observers in different gravitational fields will not agree on the time period for a lunar orbit but also they will not agree on the distance traveled by the Moon (thus they will all disagree on the velocity of the Moon). By

---

[27] [Footnote 4] **Special Relativity** says that the speed of light in vacuum is constant. But in relativity "vacuum" does not only mean outside matter but also means outside gravitational fields; that is, if you are in a gravitational field then you are not in vacuum even if there is no air around you. In this case special relativity does not hold.

It is **General Relativity** that deals with the effects of gravitational fields. And according to General Relativity, the velocity of light appears to vary with the intensity of the gravitational field:

$$c' = c_0 \left(1 + \frac{\Phi}{c^2}\right)$$

Where Φ is the gravitational potential relative to the point where the speed of light co is measured.

Simply put: Light appears to travel slower in stronger gravitational fields (near bigger mass).

using classical orbital mechanics we discovered that **if we remove the Earth-Moon system from the gravitational field of the Sun, all observers will see the speed of light outside gravitational fields to be equivalent to 12000 Lunar Orbits/ Earth Day**; but from General Relativity we know that they will never agree on a value in km/sec. An observer near a black hole for example sees the speed of light outside gravitational fields a zillion km/s, but still equal to **12000 Lunar Orbits/ Earth Day! This means that if the speed of light in vacuum is defined in km/sec then it would vary for observers in different gravitational fields, however if the speed of light is defined in Lunar Orbits/Earth Day then it would never vary because 12000 Lunar Orbits/ Earth Day is common to all observers. It also turned out to be a constant forever.**

[Quran 10:5] **It is He (Allah) who made the Sun to shine and the Moon to light, and destined it in stages; that you may learn to count the years and the mathematics. Allah only created this in truth. He details His Signs for those who are knowledgeable (scientists).**

See how angels can reach anywhere in the universe before you finish reading this sentence: Wormholes (in a later chapter).

(See the problem of Christians with the speed of light at footnote [5])[28]

[28] [Footnote 5] The Christian Bible says that the universe was created less than ten thousand years ago. Science says that the universe was created 13.5 billion years ago. We can actually observe galaxies 13 billion light years away; that is, light already traveled 13 billion years before it reached us. To fix this problem, they need the **speed of light to decay** (to slow down over time); that is, light was faster and covered that distance in much shorter time. But the theory of relativity says that the **speed of light is constant**... Since the theory of relativity contradicts their Bible, they reject it. ***They need the theory of relativity to be wrong for their Bible to be correct.***

Relativity theory and time dilation in Islam

Surprisingly, Moslems use another formula to reveal that angels indeed accelerate up to the speed of light. Their Koran states another verse in which angels traveling at a certain velocity, **appear to experience slower time than humans.** But this agrees with Einstein's theory of special relativity, which says that **a faster moving object appears to experience slower time.** Moslems use Einstein's theory of relativity with this verse from the Koran to assert that angels indeed accelerate up to the speed of light:[29]

[Quran 70.4] The angels and the Spirit ascend to Him in a day, the measure of which is fifty thousand years.

Here angels will experience one day while Humans will measure it as 50,000 years (time vs. time and not time vs. distance as the previous lunar verse). However, according to the theory of special relativity, given this time difference (time dilation) we can calculate the speed at which that object traveled. We can verify if those angels really accelerate up to the speed of light, as claimed by Moslems, or not. Moslems say that since this claim can be verified in two minutes, then there is absolutely no need for blind faith:

It was not a Moslem but a Jew, Albert Einstein, who defined the famous theory of special relativity. According to this

29 Thanks to some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously.

theory, space, time, and mass are not constant values; they change depending on the speed of that moving object. As the velocity of that object increases its time appears to elapse slower. Mathematically it is:

$$\Delta t = \frac{\Delta t_o}{\sqrt{1-\frac{v^2}{c^2}}}$$

(Where Δt_o is the time measured for a mover by a mover; Δt is the time measured for a mover by a stationary frame; v is the velocity of the mover relative to the stationary observer):

Δt_o is the time experienced by angels (one day).
Δt is the time as measured by humans (50,000 lunar years x12 lunar months/lunar year x 27.321661 days/lunar month).
v is the velocity of angels in this case (which we intend to calculate and then compare to the known speed of light).
c is the known speed of light 299792.458 km/s, the speed of light in vacuum.

From the above equation we can solve for the unknown velocity:

$$\Rightarrow v = c\sqrt{1-\frac{\Delta t_o^{\,2}}{\Delta t^2}}$$

So let's insert the Moslem claims and see if their angels really accelerate up to the speed of light or not. Insert data from this verse 'The angels and the Spirit ascend to Him in a day, the measure of which is fifty thousand years' into the formula:

$$v = c\sqrt{1 - \frac{1^2}{(50000 \times 12 \times 27.321661)^2}}$$

$$v = c \times 0.99999999999999981$$

v = 299792.4579999994 km / s

This time dilation (time difference) shows that angels indeed accelerate up to the speed of light (slightly less than c since they have mass). This can't be a coincidence because this is the same speed calculated from the previous lunar verse.

It is not a surprise that Time Dilation and the core of the General Relativity Theory are existent in Holy Koran by exact figures and meticulous details, since it is not a man-made book but the word of Almighty God revealed to His Prophet Mohammed.

General relativity: God's throne, Paradise and Hell

Moslems believe that Paradise and Hell are both much bigger and much more massive than Earth (but still much smaller than God's Throne). **The theory of general relativity says that time should pass slower near an object more massive than Earth (in a stronger gravitational field).** So according to general relativity, time should pass in Paradise or Hell much slower than on Earth. Moslems say that this is what Allah says. **It is stated in the Koran that one day in Paradise/Hell measures a 1,000 years on Earth:**[30]

[Quran 22.47] They challenge you to bring forth that torture [in Hell] and Allah will not break His promise; a day of your Lord [Paradise/Hell promise] is like a thousand years of what you count.

Here God promises those who do not believe in Hell and punishment that each day of their torture in Hell will measure a thousand years on Earth. Therefore, according to the Koran, time passes faster on Earth than in Paradise/Hell. But this agrees with the theory of general relativity which says that time passes slower near bigger mass. Paradise and Hell are much more massive than Earth and time should pass there much slower than on Earth.

Christians believe that God created the universe in six

[30] Thanks to some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously.

earthly days and rested on the seventh. Moslems believe that **six days passed at God's Throne** but we experienced **13.5 billion years on Earth:**

Moslems believe that God is not bound to His Throne; rather He created it and set it as a reference. The Koran says that God's Throne is even wider than the whole universe; so how about the mass of God's Throne? God's Throne is much more massive than Earth. Time should pass there much slower than on Earth. The theory of general relativity explains why time passes slower at God's Throne than on Earth. General relativity explains why 6 days passed at God's Throne but we measured it as 13.5 billion years **(that is, each day at God's Throne measures around 2.25 billion years on Earth).**

Science says that the Earth is 4.5 billion years old and that the universe is 13.5 billion years old. **This places the age of Earth at one third the age of the universe.** Moslems say that this is what Allah says. The Koran says that God counted six days since the creation of the universe but God only counted two days since the creation of Earth:

[Quran 50.38] We [Allah] created the **heavens and the Earth and all what's between them in six days**, and We were not touched by fatigue.

[Quran 41.9] Say: "Is it that you deny Him [Allah] who **created the Earth in two days**? And you claim others to be equal to Him? He is the Lord of (all) the Worlds."

So far, God counted two days for Earth and six days for the whole universe. **The Koran clearly states that the age of Earth is one third the age of the universe** [Footnote 6][31].

---

[31] [Footnote 6] Moslems believe that God sustains all living things. And all His commands to the angels to sustain man and animals were inscribed on the Preserved Tablet. The Koran says that not even a leaf would drop on Earth without it being previously recorded in this Preserved Tablet.

It is not a surprise that the core of the General Relativity Theory and the stronger gravitational fields of Paradise/ Hell and Throne of God, and consequently the slower time thereon, are all existent in Holy Koran by exact figures and meticulous details, since it is not a man-made book but the word of Almighty God revealed to His Prophet Mohammed.

(The Christian Bible puts the creation of Earth on day one; making the age of Earth equal to the age of the universe).

So according to the Koran:

God's Throne > Paradise/Hell > Earth
The smaller the mass, the faster the time

God says that He inscribed this Preserved Tablet before the creation of Earth started. The Koran says that God answered our prayers today (as commands for the angels on the Preserved Tablet) during the first four days when Earth was still smoke. After this God ordered Earth to form:

> [Quran 41,9-12] Say: "Is it that you deny Him [Allah] who created the Earth in two days? And you claim others to be equal to Him? He is the Lord of (all) the Worlds." [10] He set on it (Earth) mountains, and bestowed it with blessings. **And [Allah] estimated all its sustenance in four days, equally for those who ask (prayers)** [11] **AFTER THIS (Thumma** in Arabic) [Allah] commanded the heaven and it was still smoke. He said to it and to Earth: "Come together, willingly or unwillingly." They said: "We do come together, in willing obedience". [12] So [Allah] decreed them as seven heavens (one above the other) in two days and revealed to each heaven its orders. And We [Allah] adorned the lowest heaven with lights, and retentions (gravity). Such is the decree of the Exalted; the Knowledgeable.

God answered our prayers today when Earth was still smoke (the first four days). After this (**Thumma**) God ordered the Earth to form. The formation of Earth took two days. **So our prayers today are already answered on the Preserved Tablet since before the formation of the Earth started.**

Also in the last two days, God created seven heavens, one above the other, but we can only see the lights of the lowest one. The six Heavens superimposed above the lowest one with visible light contain the illusive **Dark Matter.**

Koran says that time does not pass at the same rate (time dilation). Christians don't accept this time dilation (time difference) because their Bible says otherwise. (See proof that time dilation in the Christian Bible is wrong at footnote [Footnote 7])[32]

[32] [Footnote 7] It is interesting to note that the Christian Bible has a similar claim about time dilation (time difference):

> (2Peter 3:8) But do not forget this one thing, dear friends: **With the Lord a day is like a thousand years, AND A THOUSAND YEARS ARE LIKE A DAY.** [9] The Lord is not slow in keeping his promise, as some understand slowness. He is patient with you, not wanting anyone to perish, but everyone to come to repentance.

Obviously this verse is talking about God's patience, but some Christians say that it predated the scientific claims of the Koran.

First, this verse describes time vs. time (and not time vs. distance). So if this time difference (time dilation) is due to the mass of God's Throne, then the Bible got it wrong: One day at God's Throne should measure 2.25 billion years on Earth. Instead the Bible says, "With the Lord a day is like a thousand years". Here the bible missed by a whole 2,250,000,000 years! The other part says "**AND A THOUSAND YEARS ARE LIKE A DAY**", that is, 1000 years by God measures one day on Earth; here the Bible got it in reverse! So, how small is God's Throne? Even if God's Throne is microscopic, Earth is not massive enough to generate this time dilation.

Second, if this verse was referring to time dilation due to God's movement then it got it all wrong as well. Special relativity states that a **faster moving object experiences slower time** and not the other way round. In this verse in the Bible, it is man who experiences the slower time; hence travels faster than God! Man experiences less time of 1 day (travels fast) and God experiences more time of 1000 years (travels slow). This verse practically says that once God travels faster than man but immediately follows it with a fatal mistake that man travels faster than God.

Third, some Christians claim that **Quran 32.5** (angels travel in a day the same distance that the moon travels in a 1000 years) is a restatement of this Bible verse. The problem with this Christian claim is that the Koran is referring to the angels moving and not God moving. Here in this Bible verse God has to be moving. And assuming that God is moving, not only this verse does not talk about any distance traveled, but also Christians and the Jews before them used solar years. The Jews used to add a 13th lunar month every few years to make up for the difference between the lunar and the solar year. The calculations based on their standards fail to reveal the speed of light.

No, the Bible got it wrong in every possible way.

Actually, the Bible records scientific knowledge that contradicts all modern science and genetics. While today's scientists have confirmed that animals inherit their colors and stripes from their parents (through DNA), the Bible says something else: In **Genesis 30:37-42**, the Bible explains how baby goats get their

streaked colors: If their parents were mating **AND LOOKING** at upright rods, then the baby goats will have stripes. While if their parents were mating **BUT NOT LOOKING** at upright rods, then the baby goats will not have stripes!

Do we really need science to reject this one?

Anyhow, if science is too much for the Bible, let's try common sense: Common sense says that the Sun illuminates Earth, and that without sunlight darkness will cover the Earth. Is there anything simpler? But the Bible says something else: In **Genesis 1:1-31**, the Bible explains how the Sun is related to day and night. The Bible says that on the first day, God created the light and darkness on Earth. The first evening came and the first morning followed. But God did not create the Sun until the fourth day, specifically after three evenings and three mornings. So three evenings and the three mornings occurred on Earth before there was a Sun. **So according to the Bible, daylight occurs without the Sun!**

> [Quran 2.23-24] And if you were in doubt about what We have revealed to Our servant, then bring forth a book like the Koran; and call your witnesses (scientists) to prove it contrary to Allah, if you were truthful.[24] But you cannot and will never (be able). So beware of a fire whose fuel is men and stones prepared for blasphemers.

> [Quran 42.14] They only disbanded after they received knowledge (of their Bible) fallaciously among them. And if it were not a word from your Lord [Allah] that postponed it to a later date, it would have been all settled among them then. And those who inherited the Book (the Bible) from them are in great suspicion of it. [15] Therefore call them (to the Koran) and straighten your ways as you are ordered and don't follow their passions and say: **"I believe in what Allah revealed of the Book (The Koran) and I was ordered to be just among you (both Christians and Jews); Allah is our Lord and your Lord, we have our actions and you have your actions, no argument between us and you, Allah brings us together and to Him we are (all) destined."**

To Moslems:

> [Quran 6.108] Do not curse those who call (to worship) other than Allah, so that they don't curse Allah out of spite and ignorance. This is how We [Allah] appealed to each people its own actions; then they will be brought back to their Lord [Allah] who will inform them of what they have been doing.

Pulsars and black holes in Koran

General relativity predicted the formation of black holes from neutron stars. As more matter falls into a neutron star its mass increases; and as its mass increases its gravity increases. A point will be reached where gravity would have grown so much that not even light could escape, thus a black hole forms.[33]

Most neutron stars discovered today are in the form of radio pulsars. Radio pulsars are neutron stars that emit radio waves. We can simply connect a radio telescope to a loud speaker and hear a pulsar. Pulsars sound like someone persistently knocking. Click here and listen to a slow knocking pulsar. Click here and listen to a fast knocking pulsar.

So in short, we can hear a pulsar knock; and if matter continues to fall into this pulsar a black hole will eventually form. Moslems say that this is what Allah says. **The Koran describes a star by "The one who knocks" and says that it is "The one who makes a hole".**

[Quran 86.1-3] And the heaven and the **"Knocker"** (**Tarek** in Arabic) [2] How could you know about the "Knocker"? [3] The **piercing** star (**Thakeb** in Arabic).

---

[33] Thanks to some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously.

The Arabic word "Thukb" means hole; "**Thakeb**" means the one who makes the hole. **The Koran is describing a knocking star that makes a hole.**

It is not a surprise that Pulsars and Black Holes and the core of the General Relativity Theory are existent in Holy Koran by exact figures and meticulous details, since it is not a man-made book but the word of Almighty God revealed to His Prophet Mohammed.

[Quran 26.2-6] These are the verses of a clarifying Book. [3] You might be frustrated that they don't believe; [4] If We wish, We hand down from the heaven a sign (proof); their necks to it remain subdued. [5] And every new revelation they were given from The Most Gracious [Allah] they dismissed. [6] They disbelieved (the Koran), so they will receive the news of what they have been mocking.

As per Annex 46 of 6/10/2006:-

(**A gigantic sonic boom and a periodic deep cacophony of sound emanated from a super massive black hole,** according to observations by NASA's Chandra X-ray Observatory ...

Scientists detected loops and rings in the hot, X-ray emitting gas that surrounds the galaxy and permeates the cluster (Virgo cluster of galaxies). **These features provide evidence for periodic eruptions that occurred near the super massive black hole and generated pressure waves in the gas that manifest themselves as sound ...**

"We can tell that many deep and different sounds have been rumbling through this cluster for most of the lifetime of the universe.")

As per Annex 46a:-

"**These noisy outbursts** occur when material falls toward the black hole. While the black hole devours most of the material, some of it is violently ejected in jets from regions close to the black hole that push into the cluster's gas.

These outbursts occur every few million years and prevent the gas from cooling and forming new stars, which is why M87 has retained its elliptical shape ...

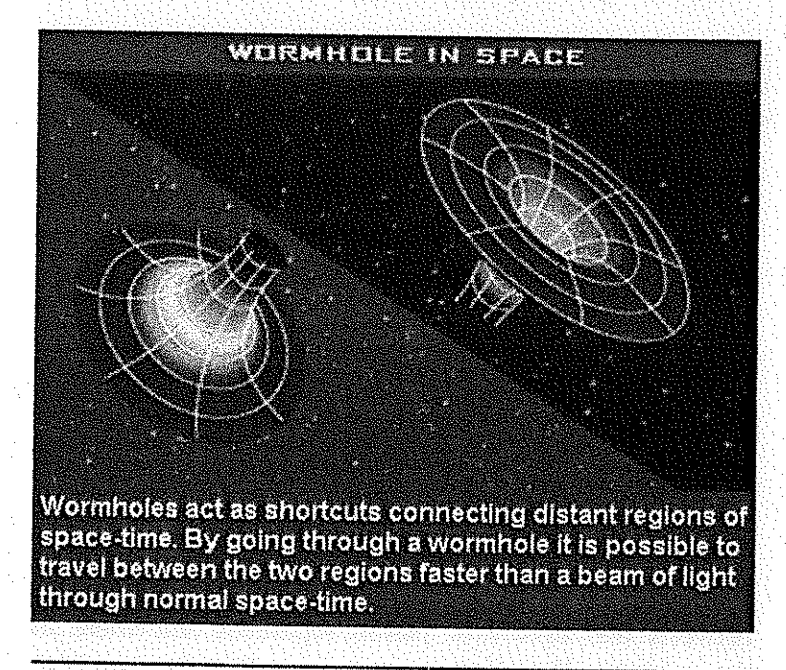
It is the strongest evidence to date of a shock wave produced by a powerful explosion, the astronomers said.

Sound from a black hole has been detected before: A black hole in the Perseus cluster was calculated to have a note about 57 octaves below middle C. The sound from M87's black hole is more discordant and deeper, with some sound waves implying a note around 56 octaves below middle C. Large outbursts like the sonic boom, are evidence of deeper notes, closer to 58 or 59 octaves below middle C."

Wormholes (Length contraction) in Koran

Look up to the night sky and select a star as a destination. Can any human reach this star by just walking few steps?[34]

General relativity explained a mechanism to contract this huge distance into few meters. Albert Einstein called this mechanism 'bridges' in space-time. Today, scientists call them wormholes. A wormhole would act as a shortcut connecting two distant regions in the universe.



Wormholes act as shortcuts connecting distant regions of space-time. By going through a wormhole it is possible to travel between the two regions faster than a beam of light through normal space-time.

---

[34] Thanks to some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously.

A wormhole contracts the distance between two doorways placed separately anywhere in the universe. A direct consequence of this distance contraction (length contraction) is the effect on the scenery. **Events at the destination would appear as if in 'Fast Forward'; while events at departure would appear as if in 'Fast Rewind':**

Example, consider a galaxy 100 million light years away. When you look today from Earth to that galaxy, you will not see it as it is today, but rather as it was 100 million years ago. This is because light took 100 million years to travel all that distance. But if you take a journey inside a wormhole from Earth to that galaxy, you would reach that galaxy today. So when you reach it today, you will see it as it is today, not as it was 100 million years ago. **So as you go forward inside a wormhole, events at that galaxy (your destination) would appear as if in 'Fast Forward' (from 100 million years ago till today).**

When you reach that galaxy today and look back at Earth, you would not see Earth as it is today; instead you would see Earth as it was 100 million years ago (you would see the dinosaurs). This is because light took 100 million years to reach there. So as you go forward inside a wormhole, events at Earth (your departure) would appear as if in 'Fast Rewind' (from today till 100 million years ago).

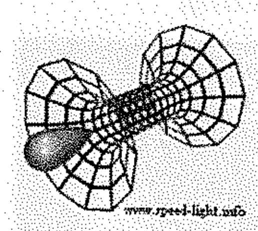
On the return journey, events on Earth (destination) would appear as if in 'Fast Forward' (from 100 million years ago till today); while the events at that galaxy (departure) would appear as if in 'Fast Rewind' (from today till 100 million years ago). **This is not time travel; this is just a consequence of the length contraction inside a wormhole.**

Therefore, in short, a wormhole contracts the distance between two doorways placed separately anywhere in the universe. The effect on scenery is that the events at

destination would appear as if in 'Fast Forward'; while events at departure would appear as if in 'Fast Rewind'. Moslems say that this is what Allah says. **God says that there are doors in the heaven that contract interstellar distances into walking distances. The resulting scenery is bizarre:**

God says that those who do not believe in the Message will not believe it even if He showed them a bigger sign. God created beautiful towering structures in the heavens. If He opens for those nonbelievers a door in heaven and lets them continue walking through it to those distant structures, they would not believe that they really got there by simply walking few steps. Instead they would think that they are just optical illusions:

[Quran 15.13-16] They do not believe the Message, like those who preceded them; [14] Even if We [Allah] opened upon them from the heaven a door and they continued walking through it [15] they would say 'Our sight is bedazzled, rather we have been bewitched' [16] It is We [Allah] who have made towering structures in the heavens and made them beautiful for beholders. [17] And We protected them from every evil spirit accursed.



Here, they wouldn't believe their own eyes, thinking that what they see is not real. They wouldn't believe that they got to those heavenly structures by simply walking few steps. But God insists that what they see is real and not illusions (that is, they really got there).

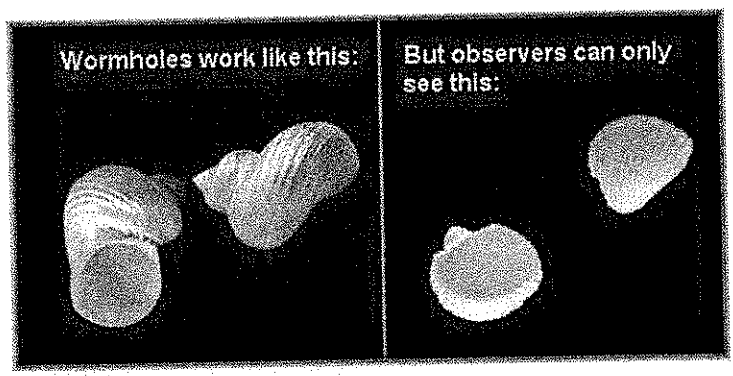
The Koran says that those heavenly doors are galactic shortcuts to distant places in the universe. Angels guard those heavenly doors 'from every evil spirit accursed'. Moslems believe that angels use these doors for long distance travel. **Angels can accelerate up to the speed of**

light for domestic travel; but they use these wormholes to reach any place in the universe before you finish reading this sentence.

It is not a surprise that the core of the General Relativity Theory and Length Contraction via Wormholes and Bridges in space-time are existent in Holy Koran by exact figures and meticulous details, since it is not a man-made book but the word of Almighty God revealed to His Prophet Mohammed.

[Quran 41.53] We (Allah) will show them Our signs in the universe, and in their souls, until it becomes clear to them that It (the Koran) is the truth. Is it not enough (for non-believers) that your Lord witnesses over all things?

Allah gave a method of transportation to his Angels throughout the universe. The Koran calls them 'Maarej' (Quran 70.3) and describes how angels use them for long distance travel. Today Moslems know that these 'Maarej' is what scientists call wormholes. Moslems also believe that wormholes are not strictly for the use of angels. **Their prophet used a wormhole once in the 'Israa & Meraaj' (Meraaj is singular of Maarej)** (Quran 17.1).



See: The Koran describes the doorways of a wormhole like two shells, exactly like modern science: Islam and Life on other Planets.

Big Bang, cosmic expansion in Koran

Science says that the universe was created in a Big Bang 13.5 billion years ago, is still expanding today, and billions of years from now it might collapse by its own gravity with a Big Crunch. Moslems say that this is what Allah says. The Koran says that on the first day of creation, God made the heavens and the Earth meshed together, tight and compact (Big Bang), continues to expand it into the universe we know today and at the last day God will recompress it into its original state (Big Crunch).[35]

About the first day (Big Bang), Allah says:

[Quran 21.30] Do not those who disbelieve see that the heavens and the Earth were meshed together then We tore them apart? And then We made of water everything living? Would they still not believe?

About expanding the universe today, Allah says:

[Quran 51.47] And the heaven, We built it with craftsmanship and We are still expanding (it).

About the last day (Big Crunch), Allah promises:

[Quran 21.104] On the day when We will fold the heaven, like the folder compacts the books, and as We originated the

[35] Thanks to some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously.

first creation We shall return it; a promise (binding on Us); surely We will deliver.

For this Big Crunch to occur more gravity is needed than the one provided by visible stars and planets. But scientists have just discovered **Dark Matter**. This mysterious Dark Matter provides the bulk of gravity that holds galaxies. This Dark Matter has weird collision properties (collision less). Simply put: we cannot see Dark Matter nor collide with it, but we can detect its gravity.

According to the Koran, we cannot see nor collide with **Jinn** but they have weight:

[Quran 55.31] We [Allah] will settle your affair, both you of weight (man and jinn).

The Jinn have weight means that we can detect their gravity and they can detect our gravity. So according to the Koran we cannot see the Jinn nor collide with them but we can detect their gravity.

Just as the Jinn is of different type that we cannot see nor collide with but we can detect their gravity, there are six other Heavens that we cannot see nor collide with either but we can detect their gravity, superimposed above the visible one:

[Quran 41.12] So [Allah] decreed them as seven heavens (one above the other) in two days and revealed to each heaven its orders. And We [Allah] adorned the **lowest heaven with lights**, and protection. Such is the decree of the Exalted; the Knowledgeable.

According to the Koran, only the lowest Heaven has visible light. This means that this Dark Matter exists in the six Heavens superimposed above the lowest one.

Also, according to the Koran, each of these remaining six Heavens is of a different type and each has its own planets like Earth:

[Quran 65.12] Allah is the one who created seven Heavens and from Earth like them (of corresponding type); [Allah's] command descends among them so that you may know that Allah is capable of anything and that Allah knows everything.

In Islam Earth is not a unique planet. Other planets like Earth do exist throughout the other six Heavens. It is just that we cannot see them nor collide with them but we can detect their gravity.

General relativity predicted Gravitational Lensing; that is, the gravitational field generated by a galaxy causes the light passing through it to bend (change direction). Since this Dark Matter does not emit any light, scientists can only map its location by using Gravitational Lensing, that is, by detecting where light is bending in places where it shouldn't. In this image a single galaxy emits light that gets bent by dozens of invisible dark matter galaxies:



Moslems say that this is how God challenges non-believers to detect the remaining six superimposed Heavens:

[Quran 67.3-4] [Allah] is the one who created seven superimposed Heavens. You do not see variations in the formations of the Compassionate, so redirect your sight, do you see any creation? [4] Then redirect your sight again, your vision returns to you in defeat and regret.

Today they looked again and found those creations indeed.

It is not a surprise that the core of the General Relativity Theory and Special Relativity Theory, Length Contraction and Wormholes, Pulsars and Black Holes, that time passes slower near bigger mass, faster objects experience slower time, speed of light, Time Dilation and Gravitational Lensing are all existent in Holy Koran by exact figures and meticulous details, since it is not a man-made book but the word of Almighty God revealed to His Prophet Mohammed.

[Quran 34.6] And those who have received knowledge (scientists) will see that what has been sent down to you from your Lord (the Koran) is the Truth, and that it guides to the Path of the Exalted, Worthy of all praise.

Science says that Earth is a sphere. Moslems say that this is what Allah says. The Koran says that when the night and the day overlap, they make a ball (sphere):

[Quran 39.5] [Allah] created the heavens and the Earth in truth. **He overlaps [Yukawer** in Arabic] **the night over the day and overlaps [Yukawer] the day over the night**, and enslaved the Sun and the Moon. Everything moves to a prerecorded destiny [on the Preserved Tablet]. Is He not the Exalted, the Forgiver?

The Arabic word "Kura" means ball; its verb "**Yukawer**" means: **to make into a ball**. The Koran says that the

overlapping of the night and the day makes a sphere (ball).

Science says that the rotation of Earth is slowing down, that is, days are getting longer. Moslems say that this is what Allah says. The Koran says that Allah persistently asks more of the day and more of the night, that is, for the day to get longer:

[Quran 7.54] And your Lord, Allah, who created the Heavens and the Earth in six days and then settled on the Throne (as reference). **[Allah] Covers the night with the day, asks for it persistently**; and the Sun and the Moon and the stars enslaved by His orders. Is this not His creation and His command? Blessed be Allah the Lord of all the worlds.

Tectonics

Science says that the Earth's crust has been slowly moving for billions of years. Not only mountains are still slowly moving but also whole continents. Moslems say that this is what Allah says:

[Quran 27.88] You see the mountains and think they are firmly fixed: but they are moving away just like the clouds are moving away: (such is) the artistry of Allah, Who disposes of all things in perfect order: for He knows all what you do.

Atmospheric Pressure

Science says that atmospheric pressure decreases with altitude; the higher the altitude the more difficult breathing becomes. Moslems say that this is what Allah says. The Koran says that as we ascend to the sky it becomes more difficult for us to breath:

[Quran 6.125] Those whom Allah wants to guide, He opens

their chests to Islam; and those whom He wants to leave astray, He makes their chests tight and constricted, as if they are ascending to the sky: Such is the penalty of Allah on those who refuse to believe.

Ice in comets in Koran

Science says that water on Earth actually came from outer space, particularly from ice in comets. When those comets enter our atmosphere, the heat generated on entry vaporizes this ice into the atmosphere. Moslems say that this is what Allah says. God says that **there are mountains in heaven that have ice inside them.** Those mountains could fall on Earth making a very bright flash.[36]

[Quran 24.43] Can't you see that Allah makes the clouds move gently, then joins them together, then makes them into a pile? Then you see rain come out from within? **And He [Allah] sends down from heaven mountains with ice inside them; that strike whomever He wishes or miss whoever He wishes; Its flash almost blinds you.**

It is not a surprise that the Holy Koran has figured out that the stars were born from heated gas and dust, has described the early stages of the embryonic* development of a fetus without ever having a microscope, has located the lowest geographical point on Earth without ever having a GPS, has identified which part of the human brain is responsible for motivation, planning and moral judgment some 1400 years ahead of the modern science without ever having the most sophisticated tools, equipment and instruments, *since it is not a man-made book but the word of Almighty God revealed to His Prophet Mohammed.

---

[36] Thanks to some unknown internet sources that have strived in the cause of Islam and have preferred to serve Islam anonymously.

Moslems ask if their prophet was not sent by God then where did this come from?

Miracle of digits in Koran

Many years ago, I read in a local newspaper an article about a computer-oriented research, conducted by a group of Moslems in US, from which I quote some excerpts as below:

Holy Koran is one of the great miracles whereby Almighty God has supported His prophet Mohammed. It is an immortal miracle wherein Almighty has guaranteed to preserve it from any falsification, alteration and modification as per Koran 15.9:

"We have, without doubt, sent down the Message; and We will assuredly guard it (from corruption)."

Holy Koran contains also countless miracles difficult to observe or comprehend unless deep studies are made of Koran and the meanings of its verses.

Hereunder we cite the miracle of digits in Holy Koran which has become possible to discover due to one of the researches conducted by help of computers in the last few years i.e. after the lapse of 1400 years from its descent.

In a mosque called "Tosan" in Arizona, United States of America, a group of Moslems utilized computers to study the digital system related to Koran's letters.

It has become obvious from this elaborate study that Holy Koran has a quite precise miraculous digital system that

rules and governs it from the beginning to the end.

This study which is conducted after 1400 years proves beyond doubt two important issues:

1 - It is demonstrated by tangible and concrete evidence for anybody having doubts about Koran that this Holy Book is from Almighty God.

2 - This Holy Koran has reached to our hands safe from any corruption, falsification, alteration or modification; otherwise, such a precise digital system - part of which is demonstrated below - would not exist with such exactness and accuracy and would not continue until now with its miraculous excellence.

The marvel highlighted by this study is the digit 19 (nineteen) which is one of the digits showing many puzzles and miracles in Holy Koran. Almighty God talks about the punishment for an Unbeliever as per Koran 74.26 to 31:

(Soon will I cast him into Hell-Fire and what will explain to thee what Hell-Fire is? Naught doth it permit to endure, and naught doth it leave alone! Darkening and changing the color of man! Over it are Nineteen, and We have set none but angels as guardians of the Fire; and We have fixed their number only as a trial for Unbelievers, in order that the People of the Book may arrive at certainty, and the Believers may increase in Faith, and that no doubts may be left for the People of the Book and the Believers, and that those in whose hearts is a disease and the Unbelievers may say, "What symbol doth God intend by this?)

Almighty God means that the angels who are the guardians of the Fire are 19 in number and that He has made this digit as a symbol for everybody and has laid secrets in this digit that the Believers may increase in Faith

and that no doubts may be left for the People of the Book: Jews, Christians and the Believers themselves.

Now let us see together some of the secrets of Holy Koran in relation to the digit 19 as below, and then let us judge: Is this Holy Koran a man-made book? Or has it reached to our hands after 1400 years with any alteration or modification?

1 – The first verse in Koran namely "**In the name of God Most Gracious Most Merciful**" - or as it is called in short BASMALA - has 19 letters – of course in its original Arabic version.

2 – Holy Koran has 114 Suras (chapters), a digit divisible by 19.

3 – The first Sura that had been sent down to the prophet is ALALAQ which is Sura No.19 from the end of Koran.

4 – This Sura of ALALAQ is composed of 19 verses.

5 – The letters of this Sura ALALAQ amount to 285 letters, a digit divisible by 19.

6 – When the angel Gabriel descended with Koran for the first time he brought along with himself 19 words exactly as per Koran 96.1-5:

"Proclaim! (Read!) In the name of thy Lord and Cherisher, Who created – Created man, out of a (mere) clot of congealed blood: Proclaim! And thy Lord is Most Bountiful - He Who taught (the use of) the Pen - Taught man that which he knew not."

7 – These 19 words are composed of 76 letters divisible by 19 with an output of 4.

8 - The first verse in Holy Koran, i.e., BASMALA has also 4 words and 19 letters which multiplied together gives also 76.

9 - When Gabriel descended for the second time he brought along with himself the first 9 verses of Sura ALQALAM - as per Koran 68.1 to 9 - till the verse 9, i.e., "Their desire is that thou shallst be pliant: so would they be pliant." These 9 verses have 38 words, a digit divisible by 19.

10 - When Gabriel descended for the third time he brought along with himself the first 10 verses of Sura ALMOZAMMIL - as per Koran 73. 1 to 10 - till the verse 10, i.e., "And have patience with what they say, and leave them with noble (dignity)." These verses have 57 words, a digit divisible by 19.

11 - When Gabriel descended for the fourth time he brought along with himself the first 30 verses of Sura ALMODDATHIR - as per Koran 74.1 to 30 - till the digit 19 in verse 30, i.e., "Over it are Nineteen."

12 - When Gabriel descended for the fifth time he brought along with himself Sura ALFATIHA starting with BASMALA which has 19 letters. This Sura descended directly after the verse 30 of Sura ALMODDATHIR i.e. after the verse: "Over it are Nineteen." Which shows that there is a solid relation, meant by Koran, between this 19 in ALMODDATHIR and the first verse of ALFATIHA which is not possible to be fluke neither possible to be man-made.

13 - Almighty God describes this miraculous digital system in relation to digit 19 in different ways as follows:
A - As per Koran 74.31 (the end of the verse): "And this is no other than a warning to mankind."
B - As per Koran 74.35: "This is but one of the mighty (portents)."

C – As per Koran 74.36: "A warning to mankind."

14 - Every word in BASMALA repeats in Koran 19 times or by digits divisible by 19. For example:
A – Name (in Arabic ISM) repeats 19 times exactly.
B – God (in Arabic ALLAH) repeats 2698 times, a digit divisible by 19.
C – Most Gracious (in Arabic ALRAHMAN) repeats 57 times, a digit divisible by 19.
D – Most Merciful (in Arabic ALRAHIM) repeats 114 times, a digit divisible by 19.

15 - Each Sura starts with BASMALA except for one Sura, namely, ALTOWBAH. It means that one BASMALA is missing i.e. 113 instead of 114. In order that the precise solid digital system may not collapse we find Almighty God acquaint us with another miracle.

If we number the Suras of Koran and consider Sura (ALTOWBAH) as No. 1 then Sura ALNAML becomes No. 19. If we read Sura No. 19 we find there an additional BASMALA as per Koran 27.30: (It is from Solomon, and is: "In the name of God Most Gracious Most Merciful.")

That means that there are 114 Suras and 114 BASMALA. In order to find the missing BASMALA you have also to use No. 19.

16 - In Sura ALNAML there are two BASMALA: one in the verse No. 1 and second in the verse No. 30. If we count the words between the two BASMALA we find 342 words, a digit divisible by 19.

17 - Digits used in Koran, e.g., "Forty Nights" … "Seven Heavens" … are 285 digits divisible by 19.

18 - The total of 285 digits is 174,591 divisible by 19.

Now let us handle another side of the miracle of digits in Koran. There are few Suras starting with one letter or a combination of letters e.g.:

طه - حم etc.

It has become clear that these letters are solidly and tightly related to the miracles of Koran's digital system, some of them are as follows:-

1 - On the study of Sura QAF, which starts with the letter:

ق

We find that this Sura contains 57 letters of

ق

A digit divisible by 19.

2 - On study of Sura ALSHOORA which starts with the letters:

حمعسق

We find that this Sura although it is a long Sura contains also 57 letters of

ق

A digit divisible by 19.

3 - Sura QAF contains 57 letters of

ق

And Sura ALSHOORA also contains 57 letters of

ق

Totaling to 114 which is the number of Koran's Sura.

What is your opinion, if I remind you that the word Koran (of course in its original Arabic version) starts with the letter:

قْ

Is it fluke? Or is Holy Koran a man-made book?

4 - The strangest thing ever imagined by a human is that the end of verse No. 13 of Sura QAF says: "The Brethren of Lot" as per Koran 50.13, whereas it is the only time that

Koran uses the word "Brethren of Lot" since it always used the word: "People of Lot". If it would have used this time "People of Lot" the number of the letters of

ق

Would have exceeded 57 and Koran's digital system would have collapsed!

5 – If we count the letters of

ن

In the **only** Sura that starts with this letter i.e. Sura ALQALAM we find 133 letters of

ن

A digit divisible by 19.

6 – If we count the letters of

ص

In the **three** Sura which start with this letter i.e. ALA'ARAF that starts with

المص

MARYAM that starts with

كهيعص

And Sura SAD that starts with

ص

We find the number of the letters of

ص

In these **three** Suras are 152 divisible by 19.

7 – If we count the letters of

ط - ه

In Sura TAHA, we find the total of these two letters is 342 divisible by 19.

8 – If we count the letters

ي - س

In Sura YASEEN, we find the total of these two letters is 285 divisible by 19.

9 – If we count the letters

ح – م

In the **seven** Suras that start with these two letters, we find the total of these two letters is 8987 divisible by 19.

10 – If we count the letters

ا – ل – م

In the **eight** Suras that start with these letters, we find the total of these three letters is 26676 divisible by 19.

11 – If we count the letters

ا – ل – ر

In the **five** Suras that start with these three letters, we find the total is 9709 divisible by 19.

12 - If we count the letter

ط

In the **four** Suras that start with it, and the letter

س

In the **five** Suras that start with it, we find the total is 494 divisible by 19.

13 - If we count the letter

ط

In the **four** Suras starting with it, and the letter

س

In the **five** Suras starting with it, and the letter

م

In the **seventeen** Suras starting with it, we find the total is 9177 divisible by 19.

14 - Sura ALRAAD starts with the four letters

ا – ل – م – ر

And the total of these letters is 1501 divisible by 19.

15 – Sura ALA'ARAF starts with the four letters

ا – ل – م – ص

And the total of these letters is 5358 divisible by 19.

16 – Sura MARYAM starts with the five letters

ك – ه – ي – ع – ص

And the total of these letters is 798 divisible by 19.

17 – Sura ALSHOORA starts with the five letters

ح – م – ع – س – ق

And the total of these letters is 570 divisible by 19.

18 – The total of the letter

ا

In the **thirteen** Suras that start with it are 17499 divisible by 19.

19 – The total of the letter

ل

In the same **thirteen** Suras are 11780 divisible by 19.

20 – The total of the letter

م

In the **seventeen** Suras that start with it is 8683 divisible by 19.

It is now clear with a tangible concrete proof, aloof from emotions, that the great Holy Koran contains a very precise complex digital system which is impossible to be man-made.

This miracle of digits is the strongest tangible evidence that Holy Koran has reached to our hands after 1400 years without any alteration whatsoever; otherwise, the whole digital system would have become upset, defective and unsound.

This is but quite little of what mankind has known so far about the secrets of this Miraculous Book.

Who knows what comes out in the next few years of the secrets of this Great Holy Book!

As the science progresses the miracles of Holy Koran become evident more and more and multiply and shut up the mouths of the Unbelievers.

Darkness of psyche and light of the soul

In order to elucidate what is Human Psyche and what is Soul, and explain the bright constructive face of the Layers of Soul, we quote a few excerpts from an earlier chapter: "Human being miniature of cosmos":

- "Almighty God has created the Layers of Soul as a support to normal matter, and for the organs and limbs of the body to grow, and for formation of the identity, personality, shape and coherence of the organs and limbs.

He has created them to give the man himself his identity, personality, shape and coherence.

Almighty God has created Layers of Soul as a support to human Psyche, in order to help it practice its mundane life easily.

Without them, the human Psyche would be motionless, void of dynamics of instincts, desires, sexuality, urge for work and for reproduction, etc. Therefore, life would be meaningless, and would have no sense whatsoever".

- "The definition of **absolute soul** that it is invisible is closer to the definition of Dark Energy, which can neither be seen by unaided eye nor by human most sophisticated tools and instruments.

Likewise, the definition of **layers of soul,** which encircle the absolute soul, that they are invisible is closer to the

definition of Dark Matter, which can neither be seen by unaided eye nor by human most advanced apparatus, appliances and devices."

- "Likewise, the Layers of Soul, that separate our material body from our **absolute soul,** give human being his shape, his coherence, his personality and his peculiar identity.

Without Layers of Soul it would be impossible for human flesh, fat, bones, muscles, nerves, limbs etc. to impart the human being his shape, coherence, personality and identity."

- "Likewise, the Soul had emerged in the embryo in his fourth month as a flashing lightening."

- "**Soul** had an absolute role, along with its army of **layers of soul,** in the birth and formation of eyes, ears, nose, mouth, hands and legs of the embryo, and also in the birth and formation of other exterior and interior parts and limbs of the body, and also in the birth and formation of regular human face, figure, form, stature etc.

Afterwards the embryo develops to a perfect human, then rises gradually from childhood to youth and adolescence; thereafter, progresses by steps to middle age and then eventually to old age etc."

- "Since human entity is a part of the universe, or since it is a **miniature of the universe,** dark energy in cosmos must exist in the human entity as well. In fact, it is there and is called Soul.

This energy existing in you had started as a lightning flashing in you in the fourth month of the embryo, thereafter only the heart began to beat and the flesh and bones started transforming into parts of the body.

Since human entity is a part of the universe, or since it is a **miniature of the universe**, dark matter in cosmos must exist in the human entity as well. In fact, it is there and is called Layers of Soul.

In order to clarify more the Layers of Soul, we quote few excerpts from space.com about Dark Matter (for more information please read the annexes):

As per annexes 2 - 2b and according to space.com dated June 30, 2005:

- (While there are many weird things in space, one of the weirdest things is - what is not there, i.e., the nothingness of the great black void. But what may be most strange about this nothingness is the possibility that it is in fact not really nothing, but rather a whole lot of something we just cannot see.

- White says we may never fully understand the nothingness of space, but with more sophisticated studies, we may eventually get used to the weird idea that nothing is always something.)

As per annexes 3 - 3a and according to space.com dated January 5, 2001:

- (What is Dark Matter? This mysterious apparently invisible stuff that researchers think is everywhere is not easily understood.

- But in recent decades, researchers have become increasingly convinced that there is a vast amount of material in the universe that does not glow at all. This mysterious "Dark Matter" is believed by most scientists to be the most common stuff in the universe, perhaps making up 90 percent or more of the total mass.)

As per annex 5a and according to space.com dated January 5, 2001:

- (If Dark Matter is made of known particles, then improvements in existing observing techniques might root much of it out.

- But if most dark galaxies are made of matter that we don't yet understand, then they may remain no more than a prediction for some time.)

As per annexes 10b - 10c and according to space.com dated April 15, 2003:

- (Dark Matter makes up about 23 percent of the universe's mass-energy budget. Normal matter, the stuff of stars, planets and people, contributes just 4 percent. - The rest of the universe is driven by an even more mysterious thing called dark energy.

- Saul Perlmutter of the Lawrence Berkeley National Laboratory, speaking at the same meeting of physicists, said: knowledge of dark matter has come a long way since the first strong hints of it emerged in the 1970s. Researchers no longer wrestle with whether it exists or how much there is but instead can focus on its properties, Perlmutter said. He added, though, that physicists should remain humble about the time it might take to figure out the remaining mysteries.)

As per annexes 11 - 11a - 11b and according to space.com dated November 15, 2011:

- (The simulation shows how exotic and invisible "Dark Matter" formed clumps that attracted normal matter, which collapsed and formed a giant star.

- The research team, led by Tom Abel at the Harvard Smithsonian Center for Astrophysics, says a lone object developed out of a cloud of raw material, a first star that became one of many seeds that later formed the first galaxies.

- Most stars today are rich in metals. But the early universe was metal-free. Astronomers have long assumed that the first stars must have been of an as-yet-unknown metal-free variety, and that they exploded soon after they were born, forging metal and flinging it into space. Later, the more diverse array of material would have been gathered up to make second- and third-generation stars. Since it is not yet possible to see these earliest stars, researchers employ computers to model what might have happened. The task is complex, but the range of possibilities is simpler than one might think, because there was little to work with in the infant universe. Most of the material and processes that makes modeling today's universe incredibly complex simply didn't exist back then. There were no magnetic fields. No space dust. No cosmic rays. And only a handful of chemical elements existed. After the Big Bang, estimated to be between 12 and 15 billion years ago, the universe was composed mostly of dark matter, invisible particles that are widely accepted to exist but have not yet been detected. A relatively smooth distribution of dark matter and some normal matter, mostly hydrogen atoms, permeated the young cosmos, theorists say. But lumps and bumps developed, catalysts that were destined to form something.

- The process began just 13 million years after the Big Bang. Small perturbations had formed in the fabric of the universe. After 100 million years, Dark Matter is attracted to these "density fluctuations," as researchers call them. Over time, several draw together to form one larger clump. Atoms of hydrogen are pulled in, too ... Some

hydrogen atoms, now pressed more tightly together combine to form molecules – molecular hydrogen. The result is the development of a molecular cloud, something seen in our own galaxy today and known to be a precursor to star formation. After 155 million years – an eye blink in cosmological terms – a cloud of normal and Dark Matter has built up the mass of a million suns. In the center, a star about the mass of our Sun is born. The very first star in the universe.)

As per annexes 12 – 12a and according to space.com dated October 6, 2000:

- (The research suggests that, contrary to prevailing opinions in cosmology, none of the currently known or theorized particles of the physical world may be able to account for Dark Matter.

- Scientists are certain that the universe is made up mostly of a mysterious, undetected substance. The way that galaxies rotate and move around each other gravitationally indicates there is much more mass than what is seen and currently identified as stars, galaxies, nebulae and dust clouds. By studying these motions, astronomers have inferred the quantity and distribution of dark matter. **The obscure material is thought to float around in large blobs called halos, each of which is centered on a galaxy.)**

As per annexes 13a – 13b and according to space.com dated September 6, 2001:

- ("We found that the stars in the galaxies and the hot gas together contribute only about 13 percent of the mass," said Steven Allen, a Cambridge researcher who led the study. "The rest must be in the form of dark matter."

- The new study "really settles the question" by providing a precise measurement of 87 percent, said Joel Bergman, a

University of Michigan researcher who was not involved in the work. But the fact remains that the stuff has yet to be found.

- Scientists assume Dark Matter is composed of some sort of tiny, invisible, elementary particle that exerts a gravitational force but otherwise interacts weakly with normal matter. Some of these particles are likely wafting under your nose as you read this. These as-yet undiscovered particles are called WIMPS, for "weakly interacting massive particles". Since the 1930s, astronomers have known that galaxy clusters do not contain enough visible matter to account for the gravity that causes the swift motions of their stars. In addition, the gravity generated by observed matter is not enough to keep individual galaxies and clusters of galaxies from simply coming unglued.)

As per annex 15b and according to space.com dated February 28, 2000:
(The potential end result confirmation of the existence of a whole new type of matter that makes up most of the universe would have enormous implications for our understanding of the universe, and thus this is expected to remain a hot research area for years to come.)

Now we turn to other thoughts about **Dark Matter** which describe it as a destructive force. We do notice such a destructive property in the human being, which is described as a devil – a vicious enemy of us – or as the "THE COMMANDING EGOISM" hot at action in the majority, destroying their intrinsic value, an unfortunate process that eventually conduces to their damnation.

Human being is a miniature of the vast cosmos. The most superb privilege we have is our capability of introspection and watching the destructive forces hot at action inside ourselves.

So whoever conquers his egoism wins and gains Salvation, and whoever does not win it is cursed and ruined.

Such intrinsic enlightenment at our interior is realized by those who follow the track of self-cognition, or what is called Track of God.

For others such things remain a riddle, because they are not focused on their interior status, and they don't watch what is really happening inside them. They live in their mental darkness and mazy imaginative minds, and have not yet come out from their dark grottos outside to the enlightened state of affairs.

In order to illustrate these things by specific cases, I have given one example in the preface to my book: "A Model Man of God".

It is the Plato's[37] story about the dark vault as follows:

(A group of people were living in a dark vault. They were born and bred over there. They never saw light throughout their life, nor they basked in the warm rays of the Sun, and bathed in the cold stream of moonlight.

They continued so until a stranger came to them from the outer world, and started speaking to them about strange things that they have never heard before:

- about a beautiful shiny world,
- gardens full of red and yellow roses,
- green vast fields,
- firmament decorated with luminous stars,
- warm and shiny Sun dazzling the eyes,

---

[37] A Muslim religious scholar – Tabatabai – describes Plato to be the propagator of Enlightenment Wisdom and a leader of a group of open gallery philosophers, who had revelations of divine knowledge and wisdom, due to a process of purification of soul, and realization of righteousness, chastity and virtue, attained through a series of discipline, self-control and self-command.

- bright moon inspiring the poets,
- the charming perfume of roses and flowers,
- whistling of nightingales,
- murmur of watercourses and flowing rivers,
- captivating sceneries of green forests brimming with tall trees, wherein sing the chanting birds, in fascinating gorgeous colors,
- And many other strange unusual fantastic things which they have never heard before.

Therefore, they got suspicious of him, and were bored and fed up with him. They thought he is trying to cheat them, contriving to steal their money, benefit from their high ranks and positions, mislead the simple people, entrap them in order to plunder their pockets and seize power and sovereignty over them.

They did not want to fall victim to his appeal and temptation, or surrender to his conspiracies. They were urging people to remain aloof and far off from him.

Nevertheless, there were few of them who became anxious to this new world, about which he was speaking. They admired this stranger whose captivating oration inflamed their zeal, thrilled them and moved their hidden desires and wishes.

They became his devotees, attending his charming lectures. They abandoned their bodily desires and dedicated themselves to the high wisdom of their Beloved.

However, the tribe leaders, followed by the ignorant majority, didn't like those changes that were heralding a great calamity.

Therefore, they undertook to put out the riot; and when they didn't succeed to silence him, they decided to exile him.

"How close are examples to the real cases!" says Imam Ali. And how close is the model man of God to that stranger who came from the outer world and walked down to the vault in that dark night!)

If the residents of the dusky vault find fault with what we say, then Imam Ali Al-Hadi had already said: **"Whoever is ignorant of something does blemish that thing"**.

The flaw that they attach to us is in fact a shadow of their eyesore or their earwax. It is in fact a reflection of their misgivings and nervous fears and doubts, originating from their own memories.

I do hope that their eyes be cleared from the blur, and their ears from the wax. I do look forward that the husks of ignorance be peeled off, since ignorance is the selfsame devil, which if overwhelms somebody tarnishes his Layers of Soul and blemishes them.

This group of Layers of Soul, totally stained and smudged, is what we call "The Commanding Egoism".

If we sight the things as they are, and the blur turns to crystal clear, and if we understand properly the terminology like devil and egoism, then we will certainly fight with all our power against ignorance lurking within us, since it is the selfsame devil, showing us its treacherous teeth. We will undertake then to purify the blemished Layers of Soul and purge them - with the help of God of course - since they constitute what we call "The Commanding Egoism".

The human being is created in a pure innocent innate intuition, which may be shaped any way – Good or Bad. Even if it takes a bad shape, it may be purified and purged later on, by the will of God. Any human being is capable of guidance and improvement, and capable of Salvation and deliverance, if God wills.

Therefore, one should not label anybody whosoever, of being good or bad. The end and destiny of everybody is in the knowledge of God, and not in our knowledge.

We can only have **unlimited hope** about people and wish them HAPPY END, and with this at the back of our minds we do write books for their Salvation – not only for the contemporary generation but for all generations to come - the selection of those who pick up the real benefits for their Salvation is in the hands of their Creator.

I remember two sayings by our prophet Mohammed which support this view as follows:

1 – One would be having the deeds of Paradise for a long time, but ends up with the deeds of Hell. Another would be having the deeds of Hell for a long time, but ends up with the deeds of Paradise.

2 – A man would be having apparently the deeds of Paradise, but he is destined to Hell. Another would be having apparently the deeds of Hell, but he is destined to Paradise.

How for example one can describe you being stingy when he has visited your house but never knocked your door? How can one describe you being improvident when he speaks to you in a language incomprehensible to you? How can one describe you being blind when he shows you paintings made of sunrays, where you see nothing!

On the other hand, when you hear or read something from us that you cannot understand, instead of finding faults and drawbacks with us, keep it somewhere in the back of your mind, until you may understand it some day in future.

It is right that one should comprehend self-cognition - the subject of our books - **but the ultimate purpose is to practice the self-cognition in the first place.**

Then only you may conceive the lofty meaning behind the language strange to you, or behind the paintings of sunrays!

Have you ever yearned for the sublime concepts hidden in the invisible supernatural world?

Have you ever tried to hear the fine tunes murmuring in the chest of a poet trying to express a world quite different from yours?

Have you ever tried to hear the spiritual songs, engraved in the souls of cognition seekers, who sing them to mould their fates in Eternity?

Have you ever tried to hear the heavenly tunes moaning inside the heart of cognition masters, deep rooted grief feeding their longing for Eternity?

Soul and the Layers surrounding the Soul constitute 96 per cent of our Existence as proved by science in the case of Dark Matter and Dark Energy.

When the Soul departs the body, the Layers of Soul remain in the body for a certain time, and then gradually dissociate from the body. Therefore, the body remains fresh for a time, thanks to these Layers of Soul.

In the earthbound human entities these Layers become dark and destructive forces of egoism and mundane desires; and henceforth, become confined in "Partition" till the day of Resurrection, as mentioned in Holy Koran 23.100:

"Before them is a Partition till the day they are raised up."

The soldiers of Soul aforesaid in an earlier chapter that they are critical in the formation of the human being and his coherence, substructure and survival, the same soldiers or Layers of Soul become the devil, our fierce wicked enemy, or the dark destructive force called "Commanding Egoism".

The difference - or the slender thread - between their bright constructive face and their dark destructive face is knowledge and ignorance.

Hence the great importance of this book - and similar books - that imparts to us the true knowledge of self-cognition, which is critical for the emergence of the bright constructive face of the Layers of Soul.

If knowledge is predominant, one can cognize the Soldiers of Soul, or the Layers surrounding the Soul, and identify their borderlines, and also the tasks and functions assigned to them for the preservation of human body, proportionate keeping of Ego and self-preservation, and for the saving and retention of the human race through reproduction.

One will be in a position to realize the red lines beyond which these tasks and functions are not legitimate or valid. If the ignorance allows them to cross these red lines, they become illegitimate and change the bright face to a dark face.

If you accurse ignorance and damn it, as Almighty God has cursed the devil, and if you let knowledge and self-cognition overwhelmingly predominate you, you will know the holy original purpose of your existence being the cognition of the Hidden Treasure and full undertaking to adopt it as a way of life.

This holy purpose of life is stated by Almighty God in the "Holy Speech" revealed to His prophet Mohammed in the night of his ascension: **"I was a hidden treasure and I loved to be cognized, so I created the Creation to be cognized."**

Prophet Mohammed says: "Whoever cognizes himself cognizes God". That is to say, the only way to cognize God is through cognizing self; or rather, they are one and the same thing, because in you is breathed from His SOUL (as Holy Koran says). That is, you already carry His Specimen, which must be cognized by you if you seek SALVATION.

Hence the importance of this book, and similar books, in learning self-cognition, which when adopted as a way of life, the whole mental status and the pattern of life take a quite new face and a new track gushing forth towards God.

But if ignorance is a commanding power - being the selfsame devil - it moulds your fate and that of nations, kings or rulers, in the form of earthbound preoccupations and mundane way of thinking, destitute of spiritual values, going astray in whatever you do, repenting all the time, weakened by adversities and easily intrigued.

Ignorance deceives individuals by desires and wishes, throws nations into dangerous situation, spoils the kings and rulers and drives them into hardships.

Those who are mounted by devil, the ignorance rules tyrannically over them as does a dictator ruler over his people, their souls go astray in desolate wilderness, and their hearts go drunken by the liquor of greed, avarice, worldly attachments and earthbound gluttony.

They are ungrateful for all the Godly boons and graces, and they demean and belittle them. They are involved

in tracking the mundane vanities and trivialities, which are full of temptations, but with bitter consequences and destructive aftermath, to which the wretched earthbound spirits are heedless, mindless and carefree.

Imam Ali describes the scenario of earthbound attachments and the bitter aftermath thereof as follows:

"Mundane preoccupation is like turbid drinking water coming out from muddy spring, deceitfully beautiful in appearance, but drinking from it is ruining.

It is a short lived self-conceit, and light that dims and fades away.

It is like when one feels at ease with his horse, gets along with it, becomes intimate with it, it suddenly topples the rider down, entangling him into the ropes, piercing him with the arrows, twisting the deadly ropes around his neck, dragging him to his narrow grave and desolate tomb, visualizing his final immortal fate, and aftermath of his deeds."

Imam Ali had described the souls as mobilized soldiers, tuning up with the friendly army, but inconsistent with the enemy.

It is quite obvious that there are good peace loving souls and malicious destructive souls. A soul is pleasant, if it keeps its pure innate intuition, but is closer to the destructive property than to peace and harmony if separated from its innocent inborn nature.

The Soul adopts two currents in the human existence for utilizing its soldiers: the short-termed[38] and the long-termed.

---

[38] Animals have only one current predominant in their existence i.e. the short-termed current, but with few differentiations from one animal to another.

The short-termed current is inclined to preserve his body and his psyche and the material world at large, in the form of self-love and earthly attachments, and also to keep up the future continuation of the human race, in the form of sexual drive[39].

As for the long-termed current, it manifests itself in the form of religion, knowledge, wisdom, self-cognition and cognizance of the Afterlife and Eternity.

This current is encompassing both the long-termed and the short-termed, and puts every current in its proper place in this existence[40].

Ignorance lies in the short-termed current, the staunch followers of which think it is the target and purpose of their life. Whereas knowledge and wisdom in the long-termed current puts everything in its proper place, and considers the short-termed current just as a means for

[39] This type of short-termed current is predominant in animals also.

[40] Religion takes care of both currents. Islam focuses at great length on the short-termed current, and teaches, in addition to different kinds of worship, the framework, within which one can satiate all his instincts, but crossing the red lines is considered illegitimate. This science in Islam is quite detailed and elaborate and is called AL-SHARIA, which teaches, on top of different kinds of worship, how to satiate your instincts in legitimate ways. In such an environment, one can live natural life, marry, bring forth children, have a normal family life and fulfill one's family and social commitments; at the same time, one can be committed to religious life and perform prayers and meditation during the day and night, perform one-month fasting during the year, perform pilgrimage once in a life-time etc.

A French thinker and a new convert to Islam Dr. Michel Pertron says:-

"The problem in Christianity is to conciliate between meditation and worship of God and our natural daily life, which we should live in this world.

It is natural that a man should marry, bring forth children, have a normal family life and fulfill his family and social commitments. Therefore, he cannot live life of meditation because of his worldly preoccupations.

Subsequently, there emerges a big difference between those committed to religious life and those practicing normal day-to-day practical life. This contrast really harassed me much and caused me many problems and difficulties.

self-survival as well as survival and continuity of the human race – both have to be well preserved.

If one considers the short-termed current as the purpose of life, instead of being a means, then here lies the big calamity of top ignorance.

It is not just the matter of ignorance, but the fates of the majority are in real danger, because ways and patterns of life are molded based on this ignorance.

In reality, this life is a farm for the Afterlife, as cited by our prophet Mohammed. Namely, this life is a fertile soil for fostering the spiritual fetus, which is growing in you for the Afterlife Eternity, and this exactly is the purpose of our existence.

The staunch followers of the short-termed current – and they are so numerous as sand on the sea-shore – are too much involved in this current, unaware of the importance of being detached from it, and ignorant of the vital value of the LEAP to the long-termed current, by virtue of religion, knowledge, wisdom and self-cognition.

Being ignorant of the long-termed current, and being determined and insistent to remain involved in the short-termed current, transform the Layers of Soul to a dark destructive force.

As aforesaid, ignorance is the self-same devil, and Layers of Soul, immersed in and contaminated by ignorance, constitute the "Commanding Egoism", which may be altered to **"blaming mind"**, and thereafter to **"tranquil, satisfied, serene and composed soul"**, by virtue of torch of knowledge and wisdom and the disappearance of the darkness of ignorance.

Human being is composed of body and soul. Body has its soldiers in the form of parts of the body, and to each part certain functions have been assigned. Likewise, Soul has its soldiers in the form of Layers of Soul, and to each layer - or a group of layers - certain functions have been assigned.

Body and its survival in this life is quite important in the wisdom of God, as is the continuation of the body and the material world in the form of human race and other species of animals, plants, solids etc.

In order for the human body to **survive**, it is imperative to have a support in the form of energy. Therefore, the means of this support is assigned to **a group of Layers of Soul**.

In order for the human race to **continue**, a support in the form of energy is indispensable. Therefore, the means of this support is assigned to **another group of Layers of Soul**.

Without the support of Layers of Soul, human survival could not be possible, nor the survival and continuation of the human race.

The means of human survival manifests in the form of self-love and earthbound attachments, whereas the means of survival and continuation of the human race manifests in the form of sexual drive.

These energies of the Layers of Soul are conspicuous and exist in the form of instincts, which are energetic enough to take care of themselves, and need no effort from the human side.

We have optimum instincts when they work in the framework of their basic needs and functions, the red

lines of which are set in the Islamic Code AL-SHARIA.

But if the instincts are let to transgress their red lines, then vanity, arrogance, ungratefulness, debauchery, depravity, corruption, rot, decay emerge. These instincts are then turned into curse.

And if instincts change to hard disposition, and cause more ignorance in people, and the devil takes the dominant power in its hands, the afflicted people are drifted to damnation.

In order to wipe out this curse, the long-termed current in the form of religion, knowledge, wisdom and self-cognition begins strongly its mission and call for Salvation.

Self-cognition - the core of religion, knowledge and wisdom - hereby appeals to you to detach yourself from all phenomena of arrogance, and devote yourself totally to the Afterlife Eternity; that is to say, to reverse completely the course of the affairs, and rearrange them to put everything in its proper place.

Instincts preserve your survival and that of the human race, automatically without your intervention. Your involvement in earthbound preoccupation and earthly attachments does not serve your instincts; instead, it brings on curse and damnation, corruption, misery and misfortune.

But detachment from this life and devotion to Afterlife require a lot of effort from your side, which you should make it your new pattern of thinking and your new way of life.

Why are NASA scientists worried?

Worry and Fear from death is deep-rooted in human being. In the next chapters, we will devote considerable time to this psychological phenomenon manifested in the ancient Greek philosophers as well as in today's NASA scientists. In the latter, it is worry about the fate of the universe after few billion years, and in the former it is worry about their own individual fate after their death.

We will show how with little more knowledge and much Faith it can be diminished to minimum, or rather wiped out totally, if we understand the Soul and its pure eternal nature and its independence from the body.

I quote excerpts from Annexes 21-21a-21b and also 22-22a to show fear and worry brought into play by NASA scientists, but for two reasons contradictory to each other.

Few fear that a mysterious force will cause universe to fly apart faster and faster, and cause our planet eventually to be absolutely lonely after a few billion years, with no neighbors nearby.

Others fear that after 6 billion years we become afflicted by a catastrophe, but for some other reason; namely, a horrible collision of some nearby galaxy with our Milky Way. But after the next billion years the far-future alien sky watchers will gaze into a rich starry sky and look all the way across space into the brilliant core of our newly formed elliptical galaxy.

As per Andrew Chaikin's article in space.com dated January 15, 2002, (Annexes 21-21a-21b):-

- Dark Energy, a mysterious force that no one understands, is causing the universe to fly apart faster and faster.

- "Frankly, we just don't understand it," says Craig Hogan, an astronomer at the University of Washington at Seattle. "We know what its effects are," Hogan says, but as to the details of dark energy, "We are completely clueless about that, and everybody is clueless about it."

- Dark Energy entered the astronomical scene in 1998, after two groups of astronomers made a survey of exploding stars, or supernovas, in a number of distant galaxies. These researchers found that the supernovas were dimmer than they should have been, and that meant they were farther away than they should have been. The only way for that to happen, the astronomers realized, was if the expansion of the universe had sped up at some time in the past.

- Until then, astronomers had generally believed that the cosmic expansion was gradually slowing down, due to the gravitational tugs that individual galaxies exert on one another. But the supernova results implied that some mysterious force was acting against the pull of gravity, causing galaxies to fly away from each other at ever greater speeds.

- It was a stunning realization.

- In one sense, the idea is not completely new. Einstein had included such an "anti-gravity" effect in his theory of general relativity, in his so-called cosmological constant. But Einstein himself, and later many other astronomers, came to regard this as a kind of mathematical contrivance

that had little relationship to the real universe. By the 1990s no one expected that the effect would turn out to be real.

- Still, anti-gravity is not the right way to describe dark energy, says Virginia Trimble of the University of Southern California at Irvine.

- "It doesn't act opposite to gravity," Trimble says. "It does exactly what general relativity says it should do, if it has negative pressure."[41]

---

[41] Einstein had assumed (a cosmological constant) or (an anti-gravity force) in order for the universe to keep its balance. He thought if the universe is left for the gravity force alone, the stars and galaxies may collapse under the violent pressure of the gravitation. But later when he came to know about his friend, Edwin Hubble's discovery of cosmic expansion, and that the universe is not balanced and settled, he repented for his assumption, for he had assumed it initially for the universe to keep its balance and stability. And if the universe is not balanced and stable, then why to assume something for a cosmic settlement that does not exist at all.

But Einstein didn't ask himself this simple question: "Why is Universe expanding?" It is a simple question that is usually asked by scientists and in the scientific circles. And if Einstein had asked this question at that time he had the answer ready in his "cosmological constant". It had been appropriate if Einstein's mind had been straight and clear and not confused by Hubble's discovery. It had been advisable if he had been vigilant and attentive to the fact that the Cosmic Expansion had in reality supported, beyond any doubt, his assumption of an Anti-Gravity Force, because without this force how can Universe expand? If he had held fast to his assumption of Cosmological Constant and held out little, he would have saved astronomy and space science, scientists and astronomers eighty years of wastage of time and effort.

And with the discovery of acceleration of the cosmic expansion in 1998 (year of declaration of this discovery), the **negative pressure** would have been the only difference in his assumption – i.e. the difference between this force and the gravitation – which clearly denotes the predominance of this force over gravity.

Or rather he could have also easily forecasted the acceleration of the cosmic expansion on pure mathematical grounds. Because according to Newton's laws, if a force is applied to some object moving at constant speed, that object would accelerate. The object in this case is the remote galaxies and stars that move away from each other because of this force.

After Einstein came to know about his friend Hubble's discovery of Cosmic Expansion, he should have taken heed to the importance of his Cosmological Constant – or anti-gravity force - as he had forecasted in his general relativity, taking into account that his new force is not for the universe to keep its balance and stability, but rather it is stronger than gravitation force, and its predominance over gravity force constitutes the **negative pressure** which causes the acceleration of the cosmic expansion.

- Trimble has a fairly simple way of imagining the phenomenon.

- ("If you think in terms of the universe as a very large balloon," she says, "when the balloon expands, that makes the local density of the (dark energy) smaller, and so the balloon expands some more, because it exerts negative pressure.

- While inside the balloon is trying to pull the balloon back together again, and the lower the density of it there is, the less it can pull back, and the more it expands. This is what happens in the expanding universe."[42]

- The supernova evidence suggests that the acceleration kicked in about 5 billion years ago. At that time, galaxies were far enough apart that their gravity (which weakens with distance) was overwhelmed by the relatively gentle

---

Einstein should have taken into consideration this new understanding (which looks very simple) and should have attached it to his General Relativity Theory. These facts are just pure mathematical notions that need only a genius mathematical mind and not any scientific progress. If he had paid heed to these facts he would have easily forecasted the acceleration of the cosmic expansion at those olden times, i.e., 80 years before supernova discovery in 1997 and that supernovas were dimmer than they should have been.

I am surprised why Einstein and other scientists, at that time, had forgotten or overlooked Newton's simple laws of motion, which imply that an object would move at a constant rate in vacuum if a force is applied to it for one time. But if the force is applied continuously the object would accelerate. If Einstein had taken heed to these facts in due course and attached it to his General Relativity Theory he would have saved the world a lot of money and efforts. It seems Einstein and other scientists had been so much stunned, dazzled and startled by Hubble's discovery in the twenties of the 20th century - and some scientists were in a state of disbelief - that they had neglected the simple laws of motion for eighty years.

[42] When Trimble says "Universe" she means the universe which comprises gravity force, and not independent of it. So in her example, when the balloon expands, that makes both the densities of the (dark energy) and the (gravity force) smaller. Since the Dark Energy exerts negative pressure - which is the difference of the two densities - the balloon expands some more. While inside the balloon (she means the gravity force inside the balloon) is trying to pull the balloon back together again, and the lower the density of it (the density of the gravity force) there is, the less it can pull back, and the more it expands. And since the **negative pressure** still continues with its exertion the balloon expands more i.e. the balloon's expansion increases all the time. This is what happens in the expanding universe.

but constant repulsive force of Dark Energy. Since then, Dark Energy's continuing push has been causing the cosmic expansion to speed up, and it seems likely now that this expansion will continue indefinitely.

- "It means that if you look out at the universe today, and if we wait many billions of years," says Hogan, "everything will be flying away faster and faster, and eventually we will be left quite alone."
- Aside from such grim forecasts, Dark Energy is causing quite a bit of upset for astronomers who have to adjust to an unexpected and outlandish new view of the universe. Already, they have had to accept the notion of Dark Matter, which is now thought to far outnumber ordinary matter in the universe, but which has never been detected in any laboratory. Now, the arrival of an unknown force that rules cosmic expansion has added insult to injury.

- "I am as big a fan of Dark Matter and Dark Energy as anybody else," says astronomer Richard Ellis of Caltech. But, he adds, "I find it very worrying that you have a universe where there are three constituents, of which only one (i.e., ordinary matter) is really physically understood."

- "When you teach undergraduates, and they say, 'Well, what is dark matter?' Well, nobody's really sure. 'What is dark energy?' We are even less sure. So you have to explain to a student, that 90 percent of the universe, 95 percent, is in two ingredients that nobody really understands," says Ellis. "This isn't really progress.")

- No one argues that Dark Energy is difficult to comprehend. And as Trimble points out, it is hardly the first strange idea scientists have had to accept.

- "It took two generations for people to be comfortable with quantum mechanics," she says. "The fact that you

do not have good intuition about (dark energy) is true for quantum mechanics, general relativity, and lots of other things, because we can't easily mock them up in the laboratory."

There is another writer, Ray Villard, who gives a quite different scenario from what Hogan has given, just opposite to his pessimistic, grim and gloomy forecasts that if we look out at the universe today, and if we wait many billions of years, everything will be flying away faster and faster and eventually we will be left quite alone.

Ray Villard forecasts, contrary to Hogan's grim and gloomy predictions, that after 6 billion years:

1 – Gravity Force will be so predominant, that a horrible calamity will take place in our Milky Way Galaxy. The nighttime ribbon and stars and dust that marked the lanes of our Milky Way will begin to come apart under the gravitational tug-of-war between the two galaxies. The sky will grow increasingly jumbled with shreds of black dust, glowing gas, and "super clusters" of brilliant blue stars. Cold, black molecular clouds will be compressed and heated until they burst apart in a firestorm of star birth. Supernova explosions from the most massive of the newborn stars will pepper the heavens with titanic blasts going off like a string of firecrackers.

2 – Far-future alien sky watchers will gaze into a rich starry sky and look all the way across space into the brilliant core of our newly formed elliptical galaxy – certainly for billions of years after the first 6 billion years from now, when the horrible calamity is destined to take place.

Ray Villard's forecasts are in conspicuous contradiction to Hogan's pessimistic predictions that:

1 - Dark Energy will be predominant after few billion years.

2 -Then everything will be flying away faster and faster and eventually we will be left quite alone.

I quote now excerpts from Annexes 22-22a from an article by Ray Villard in space.com dated September 21, 1999:

- In case you don't have enough to worry about, astronomers say, the Milky Way - our home galaxy - is destined to be involved in a disastrous intergalactic collision. The good news is: it will not happen for another 6 billion years from now, so we have plenty of time to plan.

- Our Milky Way is 100,000 light years across and contains over 100 billion stars.[43] The neighboring Andromeda galaxy, at least as massive as the Milky Way, is visible in the autumn sky as a small spindle-shaped smudged of light located 2.2 million light years away, but it is headed this way at over one million miles per hour.

- Astronomers don't know for sure if we are in store for a head-on collision or a mere sideswipe. Future telescopes will make precise enough observations to tell for sure, but supercomputer simulations show the collision will cause the Milky Way and Andromeda galaxy to merge together into a single, giant elliptical galaxy.

- Hubble Space Telescope views of spectacular collisions between other pairs of spiral galaxies in the universe have already given astronomers a preview of what is in store for the Milky Way.

---

[43] I remember in the fifties I was studying astronomy in Faiq Al-Jawhari's institute in Cairo, and he was telling us that our Milky Way contains two million stars. Now the scientists say that it contains over 100 billion stars, wherefrom you can judge yourself how much the science has progressed in only 60 years time.

- The nighttime ribbon and stars and dust that marked the lanes of our Milky Way will begin to come apart under the gravitational tug-of-war between the two galaxies.

- The sky will grow increasingly jumbled with shreds of black dust, glowing gas, and "super clusters" of brilliant blue stars. Cold, black molecular clouds will be compressed and heated until they burst apart in a firestorm of star birth. Supernova explosions from the most massive of the newborn stars will pepper the heavens with titanic blasts going off like a string of firecrackers.

- As the stars gravitationally settle into their new home, any hint of the Milky Way and Andromeda as majestic spiral galaxies will be gone. Far-future alien sky watchers will gaze into a rich starry sky and look all the way across space into the brilliant core of our newly formed elliptical galaxy.

Forces of fusion and fission in cosmos

As per Annex 21b Hogan says:

"It means that if you look out at the universe today, and if we wait many billions of years, everything will be flying away faster and faster, and eventually well be left quite alone."

The writer Andrew Chaikin has added in the same article (Annex 21b) in space.com dated January 1, 2002:

"Aside from such grim forecasts, Dark Energy is causing quite a bit of upset for astronomers who have to adjust to an unexpected and outlandish new view of the universe. Already, they have had to accept the notion of Dark Matter, which is now thought to far outnumber ordinary matter in the universe, but which has never been detected in any laboratory. Now, the arrival of an unknown force that rules cosmic expansion has added insult to injury."

I don't know why all this worry from Hogan and other NASA scientists and astronomers. They must know that **Human being is a Miniature of Cosmos. Whatever exists in the universe is present in this Miniature also.**

Since human being is capable of self-cognition through introspection, and since all the forces at action in him are found in the universe also; or rather, all the powers available in the universe are there in the human being

also (but in miniature shape), the self-cognition will facilitate the cognizance of the universe also.

Is not the human being part of the universe? Is it possible that Dark Energy be in the universe and not to be in the human being? Or is it possible that Dark Matter be in the universe and not to be in the human being?

If you want to probe the depths of the unknowns in this universe, it would be much easier to probe them in yourself, because, through introspection and self-cognition, you can feel them and watch and observe them, and see how these forces work and behave inside you.

It is quite easier for you to understand yourself, cognize yourself, assimilate yourself, comprehend yourself, grasp yourself, perceive yourself, conceive yourself, apprehend yourself etc. But to understand and feel others is not that easy. The same unknown forces that are at action in the universe are also there in the human being - functioning, operating, acting, running, working and already in operation.

There is a force inside you that grows you. You may call it Force of Fusion. It had always functioned persistently and constantly to develop your embryo in your mother's womb. It has portrayed you – the fetus - perfect without copying any model. It has pictured you unique unparalleled in the whole universe. It has shaped and figured your identity and personality unique, not only for now in the whole universe, but also for all times immemorial.

Not a single entity, from billions of billions of entities, pictures, shapes, forms, characters etc. in this existence, resembles you perfectly as you are in shape and characters. You are unique and unparalleled in the whole existence because of this Force of Fusion acting inside you.

It has created in you the flowing blood and the veins and arteries, **and let blood run through them to and fro for more than 8 times the circumference of Earth in each cycle.** It has created in you a heart throbbing continuously, **approximately one billion beats during a lifetime,** supplying you day and night with fresh blood and precious life.

But how this heart is pulsating automatically for such a long period of time? It is one of those many unknowns that a human cannot understand.

Then this Force of Fusion deposited in this heart delicate emotions and great values and morale, as if it is connected to DIVINITY - and it is so in fact - receiving from Him a force like electrical power, to help it continue its beats and pulses, and also receiving outpouring superabundance of moral values and virtues throughout lifetime.

Force of Fusion, and by virtue of power of flowing blood, composed in your face two eyes, two ears, two eye brows, brow, nose, mouth, lips and shaped in your eyes beautiful round eyeballs, and imparted to them their color and charm, and programmed for each its peculiar functions.

It built in you two hands, two feet, five fingers in each hand and each foot etc. and programmed for each its peculiar functions. It formed in your fingers wonderful lines, defining your identity and personality, in a sense that they are formed to be unique in the whole universe, the pattern of which is not repeated in any creature of this existence - billions of billions of creatures.

It created in you your body, neck, pelvis, genitals etc. It created in you your skin and hair and gave them their peculiar color. It made your lever, kidneys, spleen, intestines and programmed for each its peculiar functions.

Then it established the power of sight in your eyes, the power of hearing in your ears, the power of smell in your nose, the power of taste in your mouth, tongue and lips, the power of touch in your skin and fingers etc.

It has also created in you, teeth and tongue so that you can bite food and taste it, and also to speak and utter – a property that distinguishes you from animal.

It has created in you, bones, muscles and tissues, so that you can walk and run with your flexible legs, sit and repose on your chair or your comfortable sofas, use power with your hands and handle anything with your flexible fingers.

How great are these boons and graces and what magnificent are they!

Most important is that this Force of Fusion have created in you your brain, set up inside the brain your intelligence, acumen, insight, brilliance and also your personality, your mind, your genius, your matchless and peerless thoughts and ideas.

By virtue of the strength of your brain and mind:

1- You discover the space, universe, black holes, stars, galaxies and quasars more than 12 billion light years away from us.
2- You produce Earth-based telescopes and giant space observatories – either radio, optical, X-rays, Gamma-rays etc.
3- You launch them to their orbits by propulsion energies that you have made in your laboratories.
4- You supply them with computer programs.

All these accomplishments would not have been possible

without your brain and your mind that are produced by this Force of Fusion, which is quite unknown to you, and you don't even bother to attempt to know it and explore it.

The only reason for this alienation and antipathy is that this strange Force of Fusion has connection with you, and you assume that whatever you have is taken for granted that they are made by you, not by this great unknown force hot in pursuit at action in your machine.

You assume that it is taken for granted that your brain, your big mind and your incomparable genius are YOU and no power has created YOU and your brain, mind, genius and your entire machine.

You assume that the whole credit goes to you unaware that you are a little weak creature and in fact nothing without this Force of Fusion.

Is it not appropriate that you become little humble and modest and contemplate this great power who has created your brain and your peerless genius – I don't think you can claim that you have made this brain – and then developed your brain during your childhood, cultivated it during your youth, and increased and improved it during your middle age and your old age?

It is obvious that your brain matures during your middle age and old age, and promotes and advances if you utilize it in the best way possible.

Yes, this Force of Fusion has created your brain and a complex network of nerves connected to your brain. It is a network of communications available in your body that operates automatically to preserve your body and the relevant functions.

If anything threats your body, or any point thereof, the nerves are on the alert, informing the brain immediately. Thereupon the brain gives commands, via this strange network, to the respective parts of the body to repulse this contingent enemy.

This Force of Fusion has also created in you the genes, wherein all your physical and moral characters are deposited, including your health, your capability of breathing, sleeping, drinking, eating, practicing sex, reproducing children, making money, unique personality, wealth, social status, good characters, nobility, honesty, optimism and many other countless abundant boons by which you enjoy your physical and moral characters.

All these are originating from your genes which are made by a Creator whom you don't know and don't bother to know.

Contemplate little the magnificence of this Great Power who has created your microscopic genes, which cannot be seen by unaided eyes, and which carry all your positive and negative capabilities, aptitudes, powers, faculties, abilities!

Ponder this Magnificent Power! How He brought you to this existence in sound health and grew you in your childhood fast and consistently, and how He cultivated you physically in your boyhood and adolescence until you reached the age of 25 – which scientists say is the apex of physical growth – and then developed you spiritually and morally until you became mature at the age of 40.

Almighty God has mentioned the age of 40 as a maturity turning point in one's lifetime. Koran 46.15:

(At length, when he reaches the age of full strength and

attains forty years, he says, "O my Lord! Grant me that I may be grateful for Thy favor which Thou hast bestowed upon me, and upon both my parents, and that I may work righteousness such as Thou mayest approve; and be gracious to me in my issue. Truly have I turned to Thee and truly do I bow (to Thee) in Islam.)

At this age one is inclined and prone to introspection, meditating on countless and abundant Godly favors, boons and graces, which He has bestowed so profusely upon him.

Therefore, one turns his focus to his Creator, thanking Him all the time, and asking Him for more of His generosity and bestowal.

With these blessed contacts his yearning and longing for God springs in his heart. If any misfortune is inflicted on him, or if he is taken by sadness and despair, or if he undergoes physical or psychological pains which he cannot stand, or if he suffers disasters and calamities beyond his endurance, or if he is afflicted by painful worries which overpower his weakness, he would then whisper to his God his terrible worries, and pour into his holy goblet his tears and prayers, invoking, supplicating and earnestly imploring and impeaching to Him, asking Him relief and comfort, transcending to Divine Heights with full humble prayers.

This Force of Fusion has not just created you, and that is all, but rather it goes on creating you. This continuous creation is going on inside your living entity and does not stop until you die!

It creates in you new cells while you are sleeping, in millions and millions every night (and even in the day if you sleep). Multitudes of your cells die during the day

when you toil, labor, fatigue, exhaust and exert yourself, especially the cells of the skin. In Koran's words you scarify and scratch your cells by day; therefore, new cells have to be created.

Almighty God says in Koran 6.60:

(It is He Who doth take your souls by night, and hath knowledge of all that ye have scarified and scratched by day (your cells); by day doth He raise you up again; that a term appointed be fulfilled. In the end unto Him will be your return; then will He show you the truth of all that ye did.)

In the dark nights when you are in your deep sleep, slumbering in complete repose and silence, while your soul is busy at traveling here and there, the clouds of the Layers of your Soul throng and assemble together to manufacture new cells with their blessed fingers.

The dark nights and the strange world of sleep take us right to the treasures of life, and in that holy silence, (Tomorrow) is fast growing inside the womb of time.

Is it not worthwhile to contemplate the magnificence of sleep and what favors, boons and graces are bestowed upon us by this great power which we call Force of Fusion?

Is it not worthwhile to ponder and meditate on the stunning marvel of the process of creating your cells while you are in deep sleep, and where you have no role whatsoever neither in the amazing process of sleep itself nor in this marvelous, astounding and dumbfounding process of cell creation?

I wonder what kind of role you have in all the marvels that are done by Force of Fusion throughout your lifetime!

Don't you notice any analogy between this force and the force of gravity, which has been so crucial in the formation of the universe, in the preservation of stars and galaxies, in the conservation and retention of our own galaxy - the Milky Way - and our own Solar System with all its planets, especially our own gorgeous beautiful Earth on which we live?

Eventually, after the universe has reached its maturity - at its remote borders - the other force called Dark Energy gained the dominance over Force of Gravity and started The Process of Fission.

When a human being reaches maturity, the other force which we may call Force of Fission begins performing its tasks and functions.

Despite its delicacy, tenderness, softness, and gentleness, Force of Fission is continuous, persistent and incessant. It starts gradually to cause your elderliness, your middle age and ultimately your old age, and the decay advances in your body slowly but quite conspicuously.

Afterwards you die and the normal matter that was contained in your body returns to its origins - water to water, sodium to sodium, carbon to carbon, salt to salt, gases to gases, etc.

The forces of Fusion and Fission are there with you during your lifetime, co-existing together and exchanging their roles, although they appear to our feeble minds as if they quarrel.

During the time of your physical and spiritual growth Force of Fusion is dominant. Afterwards, Force of Fission takes the lead and control and plays its role in the best way possible.

Since both the forces are created and controlled by ONE WILL they function in full co-ordination and exchange their roles appropriately where and when required.

The universe was created and with it both the forces - the force of gravity and the dark energy - came to existence. Both play their holy roles in this life.

First the force of gravitation overruled the universe to help towards its full growth until it reaches its natural maturity.

When the universe matures the dark energy sways over it - in our times, the remote borders of the universe have reached the point of maximum maturity and have therefore succumbed to the domination of the dark energy.

These two forces have always functioned appropriately, co-operated together in exchanging roles, and they still continue with this magnificent cosmic scene.

It is quite certain that at present, and in our times, as per NASA latest discoveries in space, the gravitation force overrules the local and regional galaxies, whereas the dark energy prevails over the very remote galaxies.

As for the men of God and the masters of self-cognition who overlook the apparent shapes and forms and stare directly in the core, essence, gist and quintessence, these two forces are in fact **one power**, or **one will**, that controls the entire universe by virtue of fixed laws of Fusion and Fission, since both are parts of its fundamental laws overruling the universe.

In other words, these two forces are in reality one power, i.e., the Soul. Fortunately, westerns have no problem with the names, because they believe in Shakespeare who had said: "What is in a name?"

Imam Sadiq in his dialogue with Jabir Bin Hayyan had said:

(There is no objection to substitute Soul for Will, because Will and the manifestations thereof, in visual and sensible forms, differ not from Soul and Body.

But the infidel and the atheist would accept Will and the manifestations thereof more than Soul and Body. This Will and the manifestations thereof, in visual and sensible forms, are existent in us also.)

As for the Dark Matter, it is there within you, and constitutes 87 percent of your material entity. It is invisible and can be seen neither by unaided eyes nor by most sophisticated devices and appliances, just exactly like the Layers of your Soul, which are invisible to unaided eyes as well as to most advanced devices. Nevertheless, **Dark Matter has huge impact on the cosmos, as Layers of your Soul have conspicuously huge effect on your entire life.**

If you focus on yourself, spotlight it and keep it under continuous watch and observation, you will certainly feel the impact of the Layers of Soul on your life, and how you succumb under their tread.

The psychologists speak about nervous and physiological pressures and link them to your nervous system. But when they autopsy the body they find nothing except for a network of nerves and tissues spread here and there inside the body, but they cannot visualize these pressures. Nevertheless, you feel the impact and succumb under the tread of these pressures.

These pressures certainly exist and they are there for sure. They are due to the Forces of the Layers of Your Soul which are invisible - like the Dark Matter - but

you feel their impact and you collapse under their heavy tread, just exactly like dark matter in the universe, where galaxies are heavily impacted by it and they sink under its pressure, although it cannot be seen.

Have you ever imagined that Your Soul and the Layers of Your Soul – which represent your exact identity and personality – will remain immortal after all the damage and decay that befalls to your mortal body?

Therefore, I am much surprised why and how Hogan looks out at the universe today, and assumes with lot of horror and fear that if we wait many billions of years, everything will be flying away faster and faster, and eventually well be left quite alone.

I wonder why he wants to wait many billions of years anticipating with horror and fear that everything will be flying away; that is to say, everything will be flying apart in pieces, torn, crumbled, rented and fragmented, and then allow himself to extremely worry and be annoyed, disturbed and upset by the dark fate of the universe, whereas he is not realistic and pragmatic enough in relation to his imminent surroundings and does not look out at himself **after few years only (not many billions of years)** – maybe after a year or two or maybe after ten, twenty, fifty, sixty or seventy years, or might be little more or less – and worry for himself and for his body after death (after few years only) undergoing total decay and disintegration, torn, crumbled and fragmented in pieces!

I wonder why he wants to wait many billions of years and look out at the universe facing its dark fate, whereas he overlooks the impending bitter facts and the inevitable fate awaiting his mortal body, of which he is so proud, after few years only!

I am afraid some scientists are disassociated from their surroundings and the living facts and realities of life and go astray in wild irrelevant assumptions in their closed cabins!

The western secular mind is afraid of death and tries to escape from it and evade its memories. Maybe these are reactions of the past two terrible wars. But certainly it is due to lack of Faith in God and Eternity of Soul.

Not to mention anything about one's death is evidence that one is evading his death and the memories thereof. Secular mind fears death because it does not have faith in life after death. He does not want to face his approaching death, and therefore, runs away from its bitter memories to other bitter memories relating to after billions of years, and escaping from his imminent inevitable fate to the fate of the universe in far most future, after billions of years.

The fate of the universe is like the fate of the human being. He was created like a seed which sends forth blade, then makes it strong; it then becomes thick, and it stands on its own stem.

Koran 48.29: " ... Their similitude in the Gospel is like a seed which sends forth its blade, then makes it strong; it then becomes thick, and it stands on its own stem, (filling) the Sowers with wonder and delight ..."

Then he matures and then he surrenders to gradual decay and weakness.

All this takes place because of the Forces of Fusion and Fission, resembling gravitation force and dark energy.

In addition to Hogan, the astronomer Richard Ellis of Caltech says as per Annex 21b:

(I am as big a fan of dark matter and dark energy as anybody else, but I find it very worrying that you have a universe where there are three constituents, of which only one - i.e. ordinary matter - is really physically understood.

When you teach under graduates, and they say, "Well, what is dark matter?" Well, nobody is really sure. "What is dark energy?" We are even less sure. So you have to explain to a student, that 90 percent of the universe, 95 percent, is in two ingredients that nobody really understands. This is not really progress.)

When an adventurous voyage reaches the zenith of its progress, one might think there is not really any progress. But that point may be a breakthrough point, and I am sure it is a breakthrough point.

Science has arrived to Soul and Layers of Soul, but the scientists have just fallen short of the Great Truth. A leap of faith will certainly open their eyes to this Great Truth, that what they have arrived at after their arduous scientific voyage is the same that what prophets have said about Soul and Layers of Soul.

Once again I repeat, fortunately, westerns have no problem with the names, because they believe in Shakespeare who had said: "What is in a name?" Why not to call Dark Energy the Soul, and Dark Matter the Layers of Soul?

I wonder why the astronomer Richard Ellis in not humble as Sir Isaac Newton used to be. He is the discoverer of the gravity law; nevertheless, in his eighties he had said: "I feel as if I am a little boy playing on the sands of the seashore, and in front of me lay an ocean of unknowns that I know nothing about"!

I wonder why he does not teach his undergraduates the same modesty, and is ashamed of the fact that 95 percent of the universe is made of a great unknown energy called Dark Energy and a great unknown matter called Dark Matter!

I don't also know what this astronomer means by real scientific progress! The most learned men are those who are at the level where they introspect themselves and find there nothing but absolute ignorance.

Knowledge is not a bunch of data and facts stored in our memories or in our books and essays. A tape recorder is more worthy of such type of knowledge. **Verily knowledge is spiritual dissolution in the facts that you learn. Or in other words, knowledge is not to store but to be.**

The most sublime and elevated knowledge is the modesty, humbleness and good manners. Jesus Christ has said: "Blessed be those who are humble because they see God".

In order to perceive these two basic cosmic constituents; namely, Dark Matter and Dark Energy, it is much easier to seek them in yourself, i.e., miniature of cosmos. If these two constituents exist in you - and they are certainly there in you - then (Cognize Yourself) as Socrates says, or as Jesus Christ says, or as Mohammed, the prophet of Islam, says in his famous speech: "Whoever cognizes himself cognizes God". It seems these two are same, and they are certainly same.

You have in yourself what you have ignored and overlooked for long time: **SOUL** or **SPIRIT** - the specimen from God breathed by Him into us - as per Koran 15.29 and 38.72 God addressing Angels when He created the human being: (When I have fashioned him - in due proportion - and breathed into him of My spirit, fall ye

down in obeisance unto him).

If you cognize yourself you do assimilate this GREAT POWER hot at action in you and comprehend it as it is, **and learn how to behave yourself as per the Living Godly Pattern.**

Greek scientists: How they worried and feared death

It appears that the ancient Greek Scientists were more realistic than the Western Scientists of today. They were thinking seriously about the inevitable impending death approaching them.

But the western scientists of today worry not about their unavoidable imminent death, but rather about what may befall to the universe after many billions of years!

Is it not strange? I think they are so much under the dominion of the collective group mind (collective group psychology) that they have forgotten themselves as individuals.

Consequently, they have lost contact with forthcoming hard realities of life and have become unrealistic: forgetting their approaching decisive fate which will befall to them quite definitely (in few years time only), that they can never evade and run away from, and worrying about the fate of this universe after many billions years, that might happen and might not happen at all!

We have quoted in the last two chapters the following:-

(As per Annex 21b Hogan says:

"It means that if you look out at the universe today, and if

we wait many billions of years, everything will be flying away faster and faster, and eventually well be left quite alone.")

In the following, we cite what the ancient Greek Scientists were thinking about 2300 years ago, expressing their genuine and down-to-earth worries and fears from death.

We quote excerpts from the dialogue of Imam Sadiq with his student Jabir Bin Hayyan[44], from a book about Imam Sadiq written by 22 Western and 3 Muslim academicians, and translated from French version to Persian language by Zabihullah Mansoori, which he called "The Genius Mind of Shiism" from page 422 onwards:

Jabir – Did Plato and his student Aristotle believe in death?

Imam Sadiq – These two philosophers were Greek, and the Greek believed that death is one stage from many long stages of life. They didn't consider death as an end to life. Therefore, the caskets of their dead were decorated by lively paintings brimming with activities – like paintings of dance, hunting and sexual scenes – giving impression that those in the caskets are living persons and not dead men.

In spite of the fact that Greeks didn't believe in death; nevertheless, their scientists were not inadvertent to the matter of death. Aristokhos[45] was a Greek and an astronomer. He was a philosopher as well, and was attentive to the topic of death. He said as follows:

---

[44] Jabir Bin Hayyan is known in the West as father of chemistry.

[45] His real name is Aristarkhus and he was from Samoa. He lived in 300 B.C. and was a first class astronomer. He was the first to say that Earth rotates around Sun, and he brought to light the real reasons for the alternation of day and night. Imam Sadiq himself also believed that Earth rotates around Sun and around itself, causing rotation of day and night. Nevertheless, the scientific authorities of the medieval ages didn't approve such thoughts.

- I cannot evade thinking about hundreds of men and women who lived before me: where they have gone and why nobody sees them or hears their voice? How I enjoy the maximum happiness in that I am alive, enjoying the beauty and grace of life among hundreds of thousands of those men and women who had died and nobody came back? Will I die like them or I will not die and continue in my pleasures and delights? I feel I am privileged among hundreds of thousands of those men and women who had died, because I love life. Maybe those who had died are gone since they didn't love life and didn't like to enjoy its pleasures and delights.

- Despite the fact that I feel myself an exceptional person, and hold big hopes that I will always remain alive; nevertheless, I sometimes address myself saying; if I die what will befall to me? Will I be able after death to have the same graces and joys of life as I have now?

- Will I relish my delicious food and get pleasure from it as I do now? Will I enjoy after death listening to melodies of music as I enjoy now?

- Or will I also after my death be like animals that die everyday? Will the chicken that I have eaten yesterday come back to life once again? Will the calf that we slaughtered day before and cooked, and many of the relatives and friends ate from its delicious meat will be able to become alive once again?

- But I recant saying: I differ too much from the calf since I am a human being and that calf is an animal, and a human being deserves to become alive after death, because he has mind and knowledge, whereas the calf has no mind and no knowledge. If I would not become alive after death it would not strike me today

that I will become alive after my death and identify myself and recognize my identity also.

- I don't like that I don't identify myself after my death, because if I don't recognize myself the pleasures of life that were mine will not be mine. I should realize myself after death, so that I am rest assured that I am the one who gets pleasure from the graces of life and not somebody else.

Aristokhos passed from one topic to another as follows:

- Is it possible that I be like hundreds of thousands of grievous bleak yellow leaves which fall from the trees in autumn and vanish fast, that I too vanish utterly as they do, leaving behind nothing but dust?

- From the yellow leafage that fall from the trees in autumn, there remains nothing but dust. It sometimes strikes me that nothing of me also will remain except dust. Nevertheless, I do hear from the depths of my innate intuition that it is not so, and that I differ completely from the yellow leafage that fall from the trees in autumn, and that I am superior to the calf which was slaughtered and cooked and then relatives and friends relished its delicious meat.

- I feel that one of the privileges I have over the calf and of course over the leafage that fall in autumn, is that I feel the lapse of time whereas they don't.

- How often it strikes me what is the time that I feel? But now it strikes me that time is like a flowing river, and I am like a rock in this river. When the water reaches me it does not stop, but slows down. After a short stop it passes by me. This short stop represents my present tense which is my life.

- The higher side of the river where the water comes from represents the past tense. The lower side of the river whereto water goes represents the future tense. The moment I intercept the water, I represent the present tense. The moment the river water collides with me, that moment converts also to the present tense.

- I don't like the past tense, because it is not mine, and I cannot benefit from it.

- I don't like the future tense, because it is outside the scope of my power, and I cannot benefit from it.

- The present tense is my actual life. I live always in the present tense. Any moment I remember that I am alive, that moment is the present tense, which is neither past tense nor future tense.

- I know I have no other life except in the present tense, and my lifetime is the present tense only.

- My lifespan in the past tense is like a bird that flew away from its cage and is gone, and now it is not mine anymore.

- My life in the future tense is like a bird flying now in the sky. I have not yet caught it to put it in the cage.

- I own only the present tense, which is completely at my disposal wherefrom I benefit as I like.

- The present tense is mine as long as I am alive. Any moment I remember that I am alive that moment is the present tense.

- I wonder how some people count the past tense as part

of their life, whereas they do know that past tense is not theirs anymore!

- I wonder how some people count the future tense as part of their life, whereas they do know that the future tense that has not come yet is like the wealth that we have not attained yet and therefore we cannot consider it as our wealth!

- I wonder why some people cannot see the lucid facts, and why they don't accept that life is the present tense only! Whoever wants to benefit from his life, he has to benefit only from the present tense.

- How clear I see those people, in the ordinary life, who postpone today's work to tomorrow, and defer today's delights, pleasures, grace and beauty to tomorrow!

- They are heedless to the truth and reality that tomorrow is not theirs, since they have not owned it yet.

- Human lifetime is the present tense only and it continues to be so as long as the lifespan continues. No time in the human life is available for use except the present time.

- Yesterday, i.e., the past tense has sense only in the daily discourse, and it has no any intrinsic sense, because yesterday does not exist, and how something that does not exist can have any sense?

- Tomorrow has sense only in the daily discourse, and it has no any intrinsic sense, because something that has not come to existence yet, how can it have any sense?

- People do not know that tomorrow (if it reaches us) is the present tense.

- If I overlook tomorrow's noon time, I see tomorrow's noon like present tense not like any other day.

- Yesterday and tomorrow – in my life and the life of all human beings – have sense in daily talk only; otherwise, they have no intrinsic sense at all.

- Any moment of my lifespan is the present tense as long as I am alive. I cannot speak about any moment of my life that it is yesterday or tomorrow.

- My father also could not say – while he was alive – that any moment of his life was yesterday or tomorrow.

- My son also cannot say the same, although he is at the rashness of his youth. Every moment of his life is the present tense only.

- When I was youthful I could not understand what Democratis[46] had said that he, his father and his son were all born in a moment that is present tense only.

- Now I don't doubt at all in what Democratis had said; rather I believe in more than what he said; namely, that not only my father and my son but also all the human beings are born in a moment that is present tense and die in a moment that is present tense too.

- I am afraid to lose my present tense which is my actual lifetime.

---

[46] His Greek name was Democritos and his name in French is Democrit. He was born in 460 B.C. and died in 370 B.C., i.e., about one century before the time of Aristarkhos. Democritos was a great thinker in human history. He was the first to discover the atom, and that the world is made of very small minute atoms that cannot be seen; and since they are infinitesimal they are indivisible also, and that these minute atoms are in constant motion. He was the first to say that truth cannot be discovered by emotions, since emotions are luring us. He gave an example of the sound of thunder saying: the hearing sense would hear nothing but its terrible sound, whereas the truth of thunder is something other than its horrible sound.

- Sometimes it strikes me: is death like sleep? Then why I am not afraid of sleep and I am afraid of death?

- When I sleep I lose my consciousness and I don't recognize that I am sleeping. I forget my identity when I sleep.

- Then why I fear death which is another kind of sleep?

- I console myself! But this consolation does not appease me, and my fear from death does not vanish, because I know before sleep that I will wake up after sleep, but I will not wake up from death.

- If anybody someday has awoken from death, then from hundreds of thousands of those who had lived before me in Greece alone, let one only awake and tell me what had befallen to him after death.

- Death is a sleep without wake. I cannot console myself that I will awake, because my body is the tool of my wake, and my body will be wiped out after death. Not only my meat, skin and blood will be obliterated, but also my bones will transform to dust.

- Since my body will not remain, it is clear that I will not awake, and this exactly what causes my fear from death.

- If I knew that my body will remain after my death, I would not have feared the death much, because I would have hoped to awake someday from the slumber of death. As long as the tool of wake endures, there is some hope for it to awake.

- I have heard that Egyptians mummify their dead so that their bodies stay, and are not wiped out. There

also exist institutions dedicated to this purpose.

- But here in Greece nobody knows how to conserve bodies after death; and if it happens that somebody knows he will not be allowed to conserve a body after death, so that the body goes on and is not blotted out, because they believe that Greek Gods do not like this method since it is the method of a foreign God, and it is prevented in Greece to follow the methods of foreign Gods.

- Sometimes it strikes me to go to Egypt in my old age and die there, so that my body is mummified and is not wiped out, and I hope to awake someday after the slumber of death.

- But how fast I awake from these thoughts, because I cannot convince myself that my body is buried except in Greece, and by any method except the method of the Greek Gods, because if I am buried by any method except the Greek method I would become treacherous to my homeland.

- Sometimes I say to myself: is it not better to die in my homeland, provided that my body is conserved after my death, and I am buried by Egyptian method exceptionally.

- But soon I abandon such thoughts since deviation from the method of Greek Gods is considered treason to homeland.

- Is it possible that Gods give me a glimpse of hope that I will realize myself after death and cognize my status as I am now. I have spent a part of my life in astronomy and have discovered the laws of its motions. If Gods fill me up with such a hope, I would be flooded with

joy, delight and rejoicing, and would have gone to my grave dancing in jubilation.

- If I am filled with conviction that I will recognize myself after death, I can abstain from the pleasures of eating and drinking, and be content with hunger and thirst – If I find in the other world the delights of eating and drinking.

- I enjoy in this world my food, drink and sleep, because I find my life short. If I own immortality then why I should require pleasures of food, drink and sleep! Eternity is the greatest happiness. If I identify myself after death and know that I possess Eternity, I would have supreme authority over everything, and then I would not care about petty delights and pleasures.

- If I don't identify myself after death, then Eternity would have no sense for me, because it would be then Eternity of somebody else and not mine.

- I know that Olympic Mountain – where Gods reside – is immortal. But does the Eternity of this mountain have any sense for me?

- Of course no! Because it is the immortality of others and not mine.

- Probably it may strike me that if I don't identify myself after death; but because I am eternal and I participate that world in its immortality - and of course I am the partner of the Olympic Mountain in its Eternity - I would not be satisfied at all. What counts for me is my own Eternity. If (I) am not there, immortality has no sense for me, as the Eternity of the Olympic Mountain has no sense for me today.

Oh! Jabir. I have narrated to you part of what Aristokhos had said, so that you know that in Greece somebody had thought about death. There were few philosophers in the past who had contemplated so often the topic of death.

Fear from death has no sense in Islam

In this chapter, we continue the dialogue of Imam Sadiq with his student Jabir Bin Hayyan, which we have started in the previous chapter as follows:

Jabir – What are the results reaped by Aristokhos and other philosophers from these gloomy thoughts?

Imam – They feared death very much, because they were not monotheist and they didn't believe in the Hereafter and the Resurrection like we Muslims.

Most of these who contemplated death in the past – like Aristokhos – were afraid that they may awake from death and don't identify themselves after their bodies have vanished.

But a faithful Muslim is rest assured about his fate after death, since he knows that he will come back to life at the term appointed by Almighty God. In that appointed day, he will become alive and will recognize himself.

Moreover, he will be called to account for all his deeds. His self-identification will be so complete that he will be at his full consciousness in order to settle the account of his deeds during his lifespan in the mundane world. If he is righteous he will be rewarded by Paradise. Otherwise, he will be punished for his deeds.

Jabir – Blessed are the Muslims for their religious doctrine which has elucidated to them so clearly their status after death. Do other religions clear up to the faithful their fate after death so manifestly?

Imam – It is told to all the faithful before Islam in all heavenly religions that there exists reward and punishment after death. But the matter of reward and punishment after death was not so clear, intelligible, distinct and evident as it was in Islam. Rather the matter was vague, obscure, ambiguous, confused and uncertain in some past heavenly religions.

Jabir – Is the retribution in Islam based on fear from death?

Imam – No! It is based on the fear from punishment after death and not on the fear from death itself. The faithful Muslim is not afraid of the death itself, but of the penalty after death. Therefore, during his lifetime he evades sins and follows the commands of God, so that he may not be sanctioned after death.

I can say with full confidence that a faithful Muslim who has not committed any sin during his lifetime, when his time approaches he welcomes the death with smiles, and that his spirit flies lofty away from his body relaxed, comfortable, restful, tranquil, peaceful, calm, serene, composed, and secure.

Oh! Jabir. The retribution after death in Islam is not based on fear from death, but rather on fear from punishment after death. A Muslim, who is afraid of death, does not fear death itself, but rather the penalty after death.

Jabir – Nevertheless, fear from death continues to exist.

Imam – Fear from death in individuals is not like the panic

from some specified term. For example, a murderer, who has committed a crime and is convicted to death penalty, knows that he will face capital punishment tomorrow.

He is horrified because he knows that a certain time is fixed for his death. But no term is specified for the death of ordinary people. Almighty God says in Koran 7.34:

"To every People is a term appointed: when their term is reached, not an hour can they cause delay, neither (an hour) can they advance (it in anticipation)."

But the term is appointed by God and not by the dying person. The belief of death in the human beings is like a debtor who doesn't know the deadline of paying his debt, but he feels that the deadline is too much delayed. Therefore, there is nobody to fear death in his normal life.

It is Divine Wisdom that had appointed the term of death for everybody, but that term is hidden from everybody. Therefore, nobody thinks of death in his normal life.

In some persons this pattern of thinking becomes so strong that he becomes certain that he is immortal in this world. Therefore, he toils and labors to collect and pile up money, and is surmounted by greed and avarice as if he is alive for thousands of years.

If this Divine Wisdom didn't exist in human life, every one of us would have become like death penalty convicts, knowing that he will die tomorrow or after one hour for example.

This pattern of depression would have grown in the human society to such an extent that social turbulence, tumult, turmoil and disorder would emerge, because individuals would become impotent and unable to work and gain

their living, and would fall short of shaping and building a social life. Eventually, this despair and desperateness will certainly conduce to their utter ruin and destruction.

Jabir - God who has created a human being and donated soul to him, why He puts him to death and ruins him?

Imam - I told you that contrary to what the common people think, death is not a ruin, but just a transformation in the shape and form of life.

I do repeat once again that if a faithful Muslim is learned and knowledgeable he will not fear this transformation of shape and form, because he is certain that he will remain alive after death.

But I assume that now I am addressing a non-Muslim who asks me why God, who has created a human being and granted him a soul, is causing his death?

I do respond to him saying that death is a window through which a human being penetrates to a new life in which he will become alive once again. By the way, had you been in your mother's womb alive or not?

Jabir - Yes I was alive.

Imam - While in your mother's womb, did you eat food or not?

Jabir - Yes.

Imam - While in your mother's womb, were you a perfect and a complete man, but rather small or not?

Jabir - Yes, I believe that I was a perfect man.

Imam – Do you remember that you had been thinking about death while in your mother's womb or not?

Jabir – I don't know if I was thinking about death or not while in my mother's womb.

Imam – Forget it! What were your wishes and desires while in your mother's womb?

Jabir – I don't remember anything about my life in my mother's womb.

Imam – In spite of the fact that you don't remember anything about your life in your mother's womb; nevertheless, is your life in this world better or your life in your mother's womb?

Jabir – My life in my mother's womb was too short not exceeding nine months.

Imam – Maybe the nine months that you spent in your mother's womb appeared to you longer than 80-90 years that you will spend in this world, because time is not the same for all persons at all times, and every person has conceived this fact a little bit during his term of life.

I am confident that some hours may lapse for you so fast, in certain terms and conditions, as if they had been one hour only. Sometimes, one hour may pass for you so slow as if it had been several hours.

I want to say that those nine months which you have spent in your mother's womb might be longer than the lifetime that you spend in this world.

Oh! Jabir. In your mother's womb you were considered a perfect and a complete person and you had feeling, and

maybe you had desires and wishes because of this feeling.

Now you live in this world and you don't hold any memories of your life in your mother's womb. Don't you think now - and you are a righteous and a virtuous man - that your departure from your mother's womb and your stepping in to this world might have been a sort of death?

Don't you think that when you had been in your mother's womb you wanted to remain there and not emerge out at all from your mother's womb?

You had been imagining that there was no world better and cozier than your mother's womb. You were angry when you came out from your mother's womb - a process which I told you might have been a kind of death - and you had been even crying when you had walked in to this world.

But now you believe that this world in which you live now is better than the world in which you lived while in your mother's womb.

Jabir - Although I don't know how was my life in my mother's womb; nevertheless, I believe that this world in which I live now is better than the world in which I was living while in my mother's womb.

Imam - Is it not an indication that the world in which you will be after death is better than the world in which you live now?

Jabir - What if it would be worse than this world?

Imam - The other world is no doubt better than this world for those who perform Divine Commands in this world, because Almighty God has promised so to his servants quite clearly and frankly.

Moreover, the Mind cannot judge otherwise, because God is aware, mighty and just and bears no grudge and no jealousy whatsoever to react in revenge and transfer his servants from the better world to the worse one.

If we believe that the purpose and target of the creation is integration, perfection and completeness, we have to accept that humans become integrated, perfected and completed; subsequently, changing to better from one stage to another throughout their evolutionary stages.

If Almighty God would have not promised, quite frankly and without any ambiguity, that his virtuous and righteous servants will attain reward and eternal happiness, then the Mind would have done that and made us realize that the life of a human being after death will be better than his life in this world, because the goal and objective of creation and genesis and the ultimate cause of this ongoing sublime process is only integration, perfection and completion.

Jabir - Then we no doubt will identify ourselves after death and will never ever miss our identity.

Imam - There is no a single shred of doubt about it at all. Every faithful Muslim knows that after death, and at the term appointed by God, he will become alive and recognize himself.

Islam is superior to and more sublime than all the past heavenly religions, because of the frankness with which God's promise is made to reassure the people about their life after death.

You saw yourself the fear and worry of the polytheist from their fate after death in the aforesaid saying of Aristokhos.

But also in some past monotheistic religions people were not totally reassured about their fate after death, and their fears were close to those of Aristokhos.

They believed that they will become alive after death and will continue life in the other world, but they will not identify themselves and recognize that they were the same persons who were eating, drinking and sleeping.

Things that were available in their religions in relation to their life after death were not so clear as to convince them that they will keep their mundane feeling in the Afterlife and remember their vital earthbound characters.

Islam has removed all the obscurity and confusion from the thoughts of the faithful, and stated in frank and lucid terms that a human will become alive after death, at a term appointed by God, and he will realize himself completely and recollect all his vital mundane characteristics, and will enjoy there as he had been enjoying food and drinks in this world.

As per Divine Promise, not only the righteous will cognize themselves after death, but also the sinners and wrongdoers will be acquainted to their identities. Otherwise, how they will be called to account and be held responsible for the evil deeds that they had committed in this world if they don't identify themselves.

Jabir – Did you not tell me that the emergence of the fetus from the mother's womb is considered also as death?

Imam – I didn't say it is considered as death, but I said the departure of the child from his mother's womb maybe a sort of death.

Jabir – You are right and you said that maybe it is a sort of

death. But I want to say something else.

Imam – What do you want to say?

Jabir – I want to say that I do not recollect anything relating to the term of nine months or more that I have spent in my mother's womb, which you said that it maybe longer than my lifespan that I live in this world.

Is not my total ignorance about my life in the mother's womb an evidence proving that I will not identify myself in the Afterlife, and will not recognize my identity after my departure from this world, e.g. that I was someday – like this day – talking to you?

Jabir explained his question saying: Since I am Muslim I believe in the Divine Promise that I will realize myself in the next world. But my purpose is that this topic be handled from wisdom's point of view, that if I don't remember anything about my life in the mother's womb, how can I be reassured that I will recollect and identify myself after death in the other world?

Imam – Before entering the subject matter I say to you that proof and evidence is one thing and indication is another, and it is not appropriate to use the word "evidence" in the place of "indication".

It is imperative to present your thesis as follows: Now I don't remember anything about my life in the mother's womb, and this is an indication that gives an impression that after my death also I will not recollect my life in this world and will not identify myself.

Oh! Jabir. Not remembering anything about your life in the mother's womb is by no means evidence proving that you will not recollect after death anything about this mundane

life; it is rather an indication.

Jabir - From this indication I do infer that I will not identify myself after death in the Afterlife, and will not remember my vital characteristics relating to my earthbound life.

Imam - You should know that an atheist or a polytheist fears death because he does not believe in the life after death. In other words, he does not believe in Resurrection as much as a Muslim believes.

At the same time he knows nothing about death. Therefore, it is not appropriate for him to fear death, because if a man does not know about something, fear from that thing is irrational.

Jabir - Don't you think that an atheist fears death because he assumes that he will miss his mundane pleasures after death?

Imam - I wanted to say the same thing. An atheist or a polytheist fears death because he will lose worldly pleasures after death.

Whereas the fears of a Muslim are not due to that, since he knows that greater pleasures and delights are waiting for him in the Afterlife, and that the enjoyments of this world are finite, whereas those of the Afterlife are infinite.

The Mind judges that an atheist must not fear death, since he is completely uninformed about the other world. An atheist is not using his mind. He resorts to his imaginations and illusions in order to comprehend the world after death, and these delusions and phantoms are causing his fears and worries. These fancies and fantasies show and picture the unknowns as frightful and dreadful in the eyes of the atheist.

The atheist is afraid of death albeit he knows that he was not in this world from the very beginning, and that he came to this world from the womb of his mother, and if he departs from this world maybe it will be like shifting to another womb of an another mother.

What I say now relates to the atheist and polytheist.

As for Muslim who has faith in the Afterlife, he sees his situation after death quite clear.

I give examples and there is no argument in the examples. For example, if an atheist knew that his life had started from death, and then shifted to the womb of a mother, and his fate in this world is to shift to another womb of a mother after the end of his lifetime, he would fear also shifting to another womb of a mother, as he fears the death now, because the unknown life in the womb of a mother looks to him frightful, horrible and appalling.

Soul:
From the point of view of Islam

In the last two chapters, we quoted some excerpts from the dialogue of Imam Sadiq with his student Jabir Bin Hayyan[47]. In this chapter, we quote a part of the dialogue relating to the secrets of the Soul as follows:

Imam Sadiq - Had you ever lost your consciousness?

Jabir - No, I have not lost my consciousness so far.

Imam - Do you dream at nights?

Jabir - Yes, I dream too often.

Imam - Do you shift from place to place in your dreams?

Jabir - I shift from place to place quite often.

Imam - How do you shift from place to place whereas you know that you don't walk during sleep?

Jabir - I shift by virtue of my Soul.

Imam - Do you believe that this Soul is your soul, not of somebody else?

---

47 Jabir Bin Hayyan is known in the West as father of chemistry.

Jabir – I have no doubt it is my Soul.

Imam – Is this Soul that is shifting separated from you or not?

Jabir – It is detached from me; otherwise, how it is capable of traveling.

Imam – Your Soul that is separated from you and moves from one place to another, does it eat food?

Jabir – Yes.

Imam – Does it drink water?

Jabir – Yes.

Imam – Does your Soul, that eats and drinks, do that with your mouth?

Jabir – No, since my mouth does not shift during sleep.

Imam – Does your Soul have mouth for eating and drinking?

Jabir – No.

Imam – Albeit your Soul has no mouth; nevertheless, during your sleep and in your dreams, you enjoy delicious foods and drinks.

Jabir – Yes.

Imam – During dream your Soul is walking and traveling from one place to another without feet, seeing without eyes, hearing without ears, eating and drinking without mouth.

Therefore, your Soul is living an independent life, dispensing with your body during dreams to practice its activities.

Jabir - If there was not my body, I wouldn't be able to dream during sleep.

Imam – You cannot dream during sleep, but your Soul can remain without your body. Remember I told you that I assume you are not Muslim, and I want to say to a non-Muslim that he transmits (I) relating to him to the other world.

You said you are not able to dream during sleep without your body, and I believed you. Now I ask you this question: Your Soul during dream that has an independent life, goes wherever it wills and does whatever it wills, is it existent or not?

Jabir – Yes.

Imam – Do you doubt in the existence of your Soul and its independent life during dream or not?

Jabir – No, I don't doubt.

Imam – Do you admit the principle of wisdom saying that anything that exists does not vanish?

Jabir – Yes, I do admit it also.

Imam – **Therefore your soul, which is existent and you don't doubt its existence, does not vanish after your death. What you know as (I) is your Soul. Therefore you, i.e., your (I) - will remain also and you will identify yourself after death.**

Jabir – I don't doubt the existence of my Soul during dream. But this existence is subordinate and dependent, not isolated and independent. Without my body I don't dream, and if I don't dream I don't see my Absolute Soul having independent life.

Imam – When Sun shines on you and your shadow falls on Earth, is that shadow dependent or not?

Jabir – Yes, it is dependent.

Imam – On what is it dependent?

Jabir – It is dependent on two things: Firstly the light of Sun and secondly my existence. Without them no shadow exists.

Imam – As per the principle of wisdom, even your shadow which falls on Earth and then apparently disappears after sunset, will not vanish. Along with it goes your Soul as well, albeit it leads dependent life.

Jabir – Why Almighty God has decreed that we pursue our life for sometime in the mother's womb, then continue our life further in this world, then die and then He shifts us to a better world?

As you said God does not bear grudge or jealousy to react in revenge and shift us to a worse world.

My purpose from my question is as follows: Was it not easier and better that God keeps us from the very beginning in a better world i.e. the world after death, which we are supposed to reach, without need for the phase of the mundane life and the subsequent phase of death?

Imam – This question is an easy thing for a Muslim,

because a Muslim knows that Adam was in the paradise from the very beginning. Since he yielded to his whim and caprice he was ousted from the paradise and underwent the earthbound life.

He had to pass through the phase of life in the mother's womb and the subsequent phase of life in this world, and ultimately to experience death, so that if he proves to be righteous he goes back to paradise; otherwise, he doesn't pass the test of these phases of life and doesn't attain the positive results.

If I am supposed to address a non-Muslim, I have to know his religion. If he is a Jew or a Christian he also believes that Adam was in the paradise from the very beginning, wherefrom he was expelled, and that the stages that he has to pass through in this world are meant to purify and purge him to prove that he is worthy of paradise.

If I am addressing a person who doesn't adopt any monotheistic religion, I tell him: if you have faith in God you may ask me this question, and if you don't have faith in God then why you ask me this question that why God has not put the human being in a better world from the very beginning, and why He has forced him to experience various phases until he reaches the better world?

If an atheist is posing this question and wants to hear from me the wisdom of God, I do tell him that the purpose and target of God that a human undergoes different stages is to purify and purge him in every stage better than the previous one, and to expose him to perfection and completion via different phases of integration, until he deserves to enter the world of Eternal Bliss.

I do tell him also that Omniscient, Omnipotent God is greater than coercing a human into experiencing various

stages to eventually make him more wretched, more miser and more unhappy than he was before, and it is obvious that ultimate target of Omniscient, Omnipotent God is only the happiness for human beings.

Soul
and Psyche
in Perpetual Conflict

We have mentioned in an aforesaid chapter that a human is a miniature of cosmos. We had been always stating in our self-cognition teachings that Soul and Psyche that exist in the human beings are in perpetual conflict, and a man should be determined to let Soul surmount Psyche eventually.

The modern science in its grandiose titanic advance - rather in its monumental breakthrough into the cosmic secrets - which had been achieved in the last two decades, by virtue of space observatories that had been launched to the outer space - especially Hubble - has proved that such a rivalry is going on in the universe as well.

As per annexes 23b and 23c, of space com dated April 10, 2001, by Ray Villard:

"As the universe expanded and cooled, gravity and quintessence were locked in an arm wrestle for dominance over space. Both fields weakened with the universe's expansion. But ultimately quintessence won out over gravity and took control to push galaxies apart."

The same scenario exists also in the human being who is a miniature of cosmos. In the universe it is a conflict between quintessence and gravity, whereas in the humans it is a rivalry between Soul and Psyche.

In humans also generally both these fields tend to weaken with the advance of age. As gravity is stronger in the local and regional galaxies, and quintessence is stronger in the remotest galaxies, same is with Soul and Psyche.

Psyche is meant to preserve the human entity in this world physically, psychologically and socially - short term sight locally and regionally - whereas Soul is meant to preserve you as a Happy Entity in Eternity - long term sight in the remotest times after your death.

It is imperative that a man - or rather a man of men - to whom God has donated the capability of selection to choose his way of life, that nobody in the kingdoms of animals, plants, solids, fluids are given, to try, strive, toil and labor to let Soul dominate Psyche.

This will make you stronger day by day since you are (I) which is your Soul. You don't have to worry that if this happens your short term well-being will be affected. On the contrary, it will be much improved and enriched since Long Term Soul Is Much Wiser Than Short Term Psyche.

We have elaborated in detail in our book 'Model Scholar of Religion' that Soul is a holy sample from God lying at our custody, who has breathed into us from HIS OWN SOUL as per Koran 15.29 and 38.72 addressing the angels:

"When I have fashioned him (in due proportion) and breathed into him of MY SOUL, fall ye down in obeisance unto him".

Soul is a divine deposit trusted to us by God and He has trusted us with this holy deposit. How much He has elevated us by this trust! I hope we reciprocally cherish dearly this divine trust.

It is quite obligatory and enjoined by God on us that we let Our Soul dominate all our psychological powers that are at present dispersed and weakened by our black immature ignorance and our whims and caprices, locked up in our nervous system, suppressed and withheld in our Subconscious Mind.

All this rubbish in us, which we may call psychological complexes, or in most cases, irrational destructive powers that subdue us, are all remnants of the era of ignorance which ruled over us before the Rise of Soul. In my case, when I entered the path of God I was weeping for long days for wasting my life in ignorance, surrendering to the respective irrational, negative, destructive powers from my within.

Imam Ali says:

(It is fine and fair for a human to dislike for himself what he finds ugly for others, and to shun pride, self-conceit and arrogance, since it is irrational and blights the mind.

It is indispensable for a human who awakes from sleep, and his heart receives the first rays of the right guidance, to ask and seek more of right path, and get sufficient supply of the true religion, i.e., food for the AFTERLIFE, before his descent into his grave, and to prepare a residence (for his afterlife) before settling in his tomb, since there is no gaining divine satisfaction after death.

It is imperative for him:
1 - To preoccupy himself totally and completely with gratitude, gratefulness and appreciation for all favors, boons and graces of God,
2 - To focus on what relates to him, and evade thrusting his nose into things that don't relate to him,
3 - To cherish and embrace Wisdom as a lover embraces his beloved,

4 - To take care that his innate intuition remains pure, white, unpolluted by unhealthy black dirt of vices, uncontaminated by stains of foolish baseness, silly meanness and stupid vileness.
5 – To refuse injustice and keep the purity of his conscience and intuition,
6 – To get rid of earthbound clutches,
7 – To slip away from the mundane snares and traps,
8 - And to shun treading the mundane slipping down hills.

Whoever treads its gliding down hills slips, and whoever enters its stormy seas gets drowned, and whoever slips away from its snares succeeds.

Almighty God has coupled its luxury with misfortunes, paired its comfort with blights, and connected its joys to sorrows and grieves.

Mundane world is a transitory abode, and a place full of pains and hardships. Its resident is a traveler who will shortly depart. It is like a ship in the midst of stormy seas hit by storms and gales, whoever sinks is not rescued and whoever pulls through is ruined.)

Almighty God, who has breathed into us from his own Soul and deposited in us His own specimen, has elevated us by manifesting and appearing in us. If we ignore this elevation and divine manifestation and appearance, we would be like the one who sleeps every night on a treasure, renouncing its great value and refusing to benefit from it. I wonder who shall be the ultimate loser from this transaction!

If we overlook and neglect this holy treasure we are counted like animals, rather worse than animals. Almighty God states in Koran 7.179:

"Many are the Jinns and men we have made for Hell; they have hearts wherewith they understand not, eyes wherewith they see not, and ears wherewith they hear not. They are like cattle - nay more misguided; for they are heedless (of warning)."

HEEDLESS OF WARNING!

Our big problem is that we think that this holy verse is valid for the atheists and polytheists who lived 1400 years ago viz. for others and not for us, and we think we are far away from it, exactly as we think that death is for others and not for us and we are far away from it.

But if you enter the path of God you will see Holy Koran is alive throbbing with life, and you will see that each verse of it is for you, and you are meant in the first place by each verse of its holy verses; therefore, take your caution and start heeding the warning and working in yourself immediately without loss of time.

If we let our Soul surmount our psychological affairs and dominate our instincts that are distracted by our trivial vanities, we become a divine manifestation, rather a word of God or an influx of divinity.

This is exactly what is said by scholars of self-cognition. They don't say that they have become God (God forbid!) as is imagined and supposed by the common men, led unfortunately by some intelligentsia intending to target the men of God.

As God has donated to us the capability of selection; therefore, we can change the course of our life - if we will - and start struggling and striving to find our way to God, and seek the right guidance and a line of conduct that reveals to us how to let our Soul - Our Long Term Sight -

to surmount our Psyche – Our Short Term Sight.

Almighty God says in Koran 29.69:

"And those who strive in Our (Cause), We will certainly guide them to Our Paths; for verily God is with those who do right."

Yes, it is within our power to adopt a line of conduct which teaches us the slow but steady process of letting our Soul dominate our Psyche, despite all the hardships and ordeals, caused by Satan hiding in every corner, wrinkle and crevice of our Psyche, prowling to prey upon us at any rate.

Most difficult of all is the dominion of Satan in the network of waves, chemical and electromagnetic signals flowing into our nervous system and our Subconscious Mind.

If we are determined to continue our stubborn struggle till the last breath of our life, the power of Psyche weakens gradually, and Satan with his dreadful armies surrender to our will slowly and gradually, and our Soul becomes more and more mighty, and its dominion augments gradually.

Prophet Mohammad says: "Adopt the manners of God". Most of us have not entered **the line of divine conduct** to start this holy purification process. If we begin with this **Path of God** and are determined to continue our way till the last drop of our blood, and adopt gradually the divine manners and divine oversight and divine wisdom, we become a Godly manifestation, rather an Influx of Divinity.

What fills us with hope is that Almighty God is Generous, has not confined His Landmarks of Divinity in the past

prophets, as common men think, but the process of the Words of God or Holy Divine Influx is continuous from Adam to this day until the last man on this Earth, and will never come to end. Likewise, the Generosity and Treasures of God will never come to end.

Almighty God says in Koran 31.27:

"And if all the trees on earth were pens and the Ocean (were ink), with seven Oceans behind it to add to its (supply), yet would not the Words of God be exhausted; for God is Exalted in power, full of Wisdom."

Words of God or the Divine Influxes are not confined to the past prophets only, but Almighty God has spread it also to the self-cognition scholars, men of God and the righteous servants of God. Yes, we are the Words of God or Divine Influxes or Divine Manifestations if we become part of them and pursue their ways of life and tread in their steps.

When we reach almost forty years of age and enter the Path of God, all the years preceding it are considered as years of black ignorance. In this dark epoch many psychological complexes and distortions are developed in ourselves - in our nervous and physiological systems and in our Subconscious Mind - and all these have to be straightened.

But there exist between us and them very thick obscuring veils and mantles piled up upon each other, by virtue of which we lose sight of the core problem, and get preoccupied with their painful effects.

We heed and observe them long after we have treaded the Divine Path, where we find crystal clear the landmarks of ourselves as they are.

In my book called 'Five Masters of Self-Cognition', I have set apart a special chapter for The Intriguing Stumbling Block or ISB, which is the last barrier in our way to God.

We mentioned that it took the famous scholar Bayazeed Bastami five years to overpass it after he had observed it. In my case, it took me 29 years after I had entered the Divine Path in year 1975 to ever heed and observe such an ISB in my existence.

If it would not have been the Divine Providence I would not have observed it, and such a peerless struggle would not have been easy for me, the hardships and ordeals of face-to-face strife with Satan could not have been subdued, the dark locked vaults of my nervous network would not have opened for me, the darkness of my Subconscious Mind would not have been enlightened, and all these nasty but tasty difficulties would not have been surmounted.

Here lies the core secret world of self-cognition, and there is in reality nothing new without. Outside you there is nothing new. Outside world is colored by your mood and your finite knowledge; it is a reflection of your SELF. If your SELF is dark and gloomy it is dark and gloomy. If your SELF is Beauty and Magnificence it is so. You carry your world – good or bad – within yourself.

If Almighty God wants to donate to you His transcendental hidden secrets, He says (BE) and it comes to existence. Nothing is obstructing His Will, and nothing can prevent His Donations if He wills so.

Imam Ali says:

(Almighty God is aware of:
1 – Things hidden deep in the hearts,
2 – Metaphysical and Supernatural secrets,

3 - What the ears listen to stealthily,
4 - Nests of ant,
5 - Abodes of insects,
6 - Moan of the mother camel that loses its baby,
7 - Hiss of feet,
8 - Husks where the fruit grows,
9 - Hiding places of the beasts in the caves of the mountains and the valleys,
10 - Hiding places of mosquito between the twigs of the trees and their husks,
11 - Husks where leafage grow on the twigs,
12 - Spinal Cord where sperm is resting,
13 - Places where the clouds emerge and gather,
14 - Places where the raindrops are formed inside the amassed clouds,
15 - Things tornados drag with their tails,
16 - Things that are crushed by torrential rains,
17 - The floating of earth plants over the dunes of sand,
18 - Nests of eagles on the mountain peaks,
19 - Singing of birds in their dark nests,
20 - Things contained in the seashells,
21 - Things that grow under the sea waves,
22 - Things that are concealed in the darkness of night,
23 - Things that sunshine sheds light upon,
24 - Things that fall under alternation of gloomy mantles of darkness and flood lights,
25 - Hums of every hummingbird, and of every roaming animal,
26 - Fruits or leaves that fall on the ground,
27 - Sperm resting in the spinal cord,
28 - Leech-like clot, soaked and saturated blood drop, and morsel of flesh,
29 - Embryo in process of formation,
30 - Fetus formed and ultimately converted to a perfect baby.

This awareness is an easy process for Him going on without impediments. He preserves whatever he has created

without any difficulty. He manages and administers all the affairs of His creatures without ever getting tired and without a shred of languishment.)

Telling the truth I even didn't know the meaning of (Oh God! Detach my neck from Fire), which is so widespread in the prayers of the Imams. Since I am living in the Enlightenment of self-cognition I wanted to know what is tying my neck to Fire. Since I seek detachment and liberation from Fire, the relative facts came to light in the Night of Power – Night of Qadr.

Almighty God says in Koran 90.11 to 16:

"But he hath not overstepped the barrier. And what will explain to thee the barrier? (It is) freeing the bondman; or the giving of food in a day of privation to the orphan with claims of relationship, or to the indigent (Down) in the dust."

This is the detachment of my neck and your neck from Fire and from shackles, fetters and chains, of which we know nothing in our normal life, and assume that these things will happen after billions of years on Resurrection Day, unaware that all these things should be accomplished in your lifetime, which is your only opportunity in this world. This world is the farm for the next world - as Prophet Mohammed has said - and you will harvest there what you sow here.

As for the giving of food in a day of privation to the orphan with claims of relationship, or to the indigent (Down) in the dust, it is in fact the feeding of the Needy of God.

Oh God! Render me to be from those who feed the Needy of God from your serving dish! Where are those in desperate need like Moses who says, as in Koran 28.24: "Truly am I in (desperate) need of any good that thou dost send me."?

I do say frankly that I have benefited a lot from writing my books, and I am the first to benefit from them, and God has guided me to His Paths. Koran 29.69:

"And those who strive in Our (Cause), we will certainly guide them to Our Paths: for verily God is with those who do right".

My personal experience of taming the **Intriguing Stumbling Block (ISB) or Barrier** is not but a fruit of my writings which God has simplified for me.

I hope that Needy of God will eat from these fruits also; and verily they are Fruits of Paradise. Divine Serving Dishes are set forth, where are the Needy of God to eat from them?

It is the Harp of the Kingdom of God, angels are playing on it the music of Eternity, to charm the minds of the Needy of God and entice their hearts to enable them respond in ecstasy.

Angels carry them on their wings to the heavens, the wings chanting a tone as if it is a star that is singing, the moon longing for its tones, the stars yearning for its harmony and rhythm.

Bestowal is an intrinsic need of Paradise Fruits without which they cannot live, as intake is a desperate need of the disciples, without which they cannot gain life.

The Magnificence of the Kingdom of God is a picture that the disciples see albeit they close their eyes, the Music of Eternity is a Hymn and an Anthem that they hear albeit they close their ears, the hearty aromatic scent of Divinity is a perfume of roses and flowers that they smell albeit they close their noses.

Those who chant their secrets in the Ears of Eternity are a band of angels who flap their wings for ever.

The western scientists have broken through the screens of the cosmic secrets. Is it not appropriate for us now to have a breakthrough into the veils of secrets of Soul and Psyche?

After penetration into the secrets, cognition of the depths of Self, overstepping its obstacles, hindrances, impediments, barriers and handicaps, and after breaking its shackles, fetters and chains, and ultimately after taming The Intriguing Stumbling Block (ISB) or The Principal Barrier, there is a peerless Eternal Happiness, which remains with you at the end of your life and in the Eternity after your death in the Afterlife.

As I have elaborated in my book called: Model Scholar of Religion, remember that Eternal Happiness is what we aspire at, is what our Innate Intuition craving and thirsting for, it is the basic pillar around which our life rotates.

Overstepping ISB and detaching our neck from Fire lead us to the shelters of mildness, homelands of ease, comfort and abundance, strongholds of protection, and life of glory and honor.

ISB or The Principal Barrier consists, above all, of Ungratefulness to God that lingers in our nervous system and our subconscious mind, including all the impurities of the past dark years of our ignorance of doubts, hidden worship of concerns other than God, non-appreciation and non-admiration of the abundance and affluency of God's gifts and boons etc. Common men do so often thank God but by tongue only. Advanced disciples thank God perpetually deep in their inner self and deepen their understanding, appreciation and admiration of the influx,

affluency and abundance of God's gifts, boons and graces in their nervous system and their subconscious mind.

These are deep-rooted in our nervous and physiological systems and in our Subconscious Mind. They are the remnants of the era of ignorance of our childhood and adolescence, before we were guided into the Line of Divine Conduct and the Path of God.

In those dark epochs we had egocentric orientation, assuming that we are managed by ourselves - ego involvement - and we have the full power of selection and determination of our fate. We were not serious enough to implore and impeach God to manage us towards our Enlightened Fate. We used to repeat in our prayers: 'Oh God, guide us to the right path' but by tongue only. It was not done in servitude, humility and tears of serious impeachment and imploration in our inner self.

In those unfortunate days God had delegated us to ourselves. Self is essentially crooked in the first place. It had conceived the things in its own special way, which was full of ignorance, immaturity, pride, arrogance, self-conceit, etc.

In those days God had not yet bestowed upon us detachment from the mundane world of pride, and had not donated to us inclination to Eternity.

Pride along with its adherent and adhesive basic elements of hard feelings of shame and infamy receive, understand and conceive the things in their own difficult hard way, and with sensitive nervous and physiological reactions.

Instead of understanding that our powers are in fact powers of God affluent in the whole existence, our nervous system was thinking that it is our own powers, rotating

around an imperialism of SELF, headed by the Emperor Satan.

Instead of perceiving that our self-management is in fact the management of God affluent in the whole existence, our nervous system was thinking it is our own management.

Because of our black and dark ignorance, the powers of our self-management, and all other powers within us, were placed by us in the wrong place.

This ignorance had caused complex accumulated psychological frustrations in us, which had leaked into our Subconscious Mind, and eventually appeared as hard feelings and consequent involuntary spontaneous physiological convulsive movements of legs, hands, body, head, face, eyes etc.

If we want to place the things in their proper place, we have to know that our powers and our self-management are from Almighty God which is affluent in the universes. Little minute speck of the Divine power and management apparently invested in us for mundane day-to-day life is not wielded by us properly. These should be wielded for attempts only and the outcome is from God, to whom we should entrust and delegate.

Our only concern and only involvement should be gratitude, gratefulness, thank, admiration and appreciation of the Divine Powers and Divine Management and nothing else. Anything else is mere delusion and outside the scope of Reality and Verity and therefore causes frustrations in us.

If gratitude, gratefulness, thank and appreciation is not rooted deep in your Nervous System and your Subconscious Mind, then you are living in the Hidden

False Worship i.e. Hidden worship of concerns other than God, which is the impurity itself.

Our SELF unfortunately had enthroned itself - in the days of its imperialism and under Emperor Satan - as a partner of God! God forbid from Ignorance!

As long as gratitude to God is missing from the depths of our depths and the interiors of our interiors, then Hidden False Worship - worship of concerns other than God - is there prowling to prey on us.

The more you thank God in your depths and in your interior and enjoy it, the more the dominion of the Hidden False Worship weakens, dwindles, wanes, diminishes and declines. Ultimately, Satan surrenders, as occurred to Prophet Mohammed who had said: "My Satan surrendered to God at my hands and God helped me to surmount it."

Eventually, Satan and its armies flap the white flag as a signal of submission, thanks to perpetual inner prayers to God and stubborn everlasting struggle, accompanied by pure purpose, sincerity, loyalty, devotion, intention, resolution and determination of man of men.

The process of eradication of the long deep-rooted ungrateful egocentricity and Hidden False Worship from your nervous system requires the lifetime strife and struggle.

Such involuntary nervous and subconscious impurity is a sort of split in the personality of a disciple, who had gone long way through the Road to God.

Nothing can fill this wide vacuum in his personality, and fill up this chronic void and gap in his existence, except perpetual deep-rooted thanksgiving and thank offering to

Almighty God. It is the only way for the disciple to achieve perfect righteousness, chastity, modesty, virtue and purity in all his existence.

The reason why it takes so long time for the advanced disciple is that the core enemy is hidden and concealed behind accumulation and piling up of false shells, husks and thick layers, that he cannot probe for his way to the core enemy – ungrateful egoism – because it preoccupies him all these long years with the hard feelings of its false shells and husks.

Each layer of it poses by itself a big problem in his life that requires certain words of the remembrance of God (ZIKR) – at every progress – and stubborn inner strife and struggle with SELF, probably for months or years, in order to eradicate it from his existence – or to be more accurate, it is Almighty God who eradicates it from his existence.

The most effective words of the remembrance of God (ZIKR), I have found are those adopted by the Righteous Men of God i.e. "Oh God take charge of me as you take charge of your Righteous Servants". It makes miracles!

If the disciple is not well resolved and determined to battle the Hidden False Worship and the chronic ungrateful egocentricity within himself – with all its shells and husks one by one – then he has not started yet the Greater Holy Struggle and Strife or Jihad Against Self.

False Worship – or in other words Ungrateful Egoism in your inner core – is deep rooted in your nervous system and your Subconscious Mind. The process of eradication of all these shells and husks that are piled up upon each other may take years or decades, provided you really work, toil and labor in purifying yourself quite seriously and in full devotion and dedication.

It is the ISB, about which I set apart a special chapter in my book called 'Five Masters of Self-Cognition'. Overstepping it and subsequent final Salvation is equivalent to liberation of my and your neck from its shackles, fetters and chains. It is the liberation of my and your neck from Fire!

Second time
vision
into cosmos

Scientists are puzzled about the black holes and their formation in the midst of galaxies into the depths of the universe. They are cosmic dinosaurs, giant, mammoth, huge, mighty and powerful. They cannot be seen by eyes neither by most sophisticated telescopes and very sensitive devices.

Omnipotent Almighty challenges us by saying: Koran 67.4:

"Again turn thy vision a second time; (thy) vision will come back to thee dull and discomfited, in a state worn out."

Imam Ali says:

(How if all animals, birds, beasts, etc. – either in their dens, barns, stables etc. or in their pastures, grasslands and grazing lands – or all idiot and intelligent nations come together to create a mosquito, they wouldn't be able to do so, neither find a way to originate it.

Their minds would confuse and puzzle, their powers would prove weak and impotent. They would return back weary, fatigued and exhausted, knowing that they are defeated, admitting their incapability to create it, acceding to their weakness to exterminate it.)

Almighty God speaks to us about the dull and discomfited, weak and beaten vision, in a state worn out, possessed by this weak human, albeit he is a NASA pioneer scientist possessing most sophisticated ground and space optic telescopes, greatest genius, innovator, originative minds, most advanced photographic cameras of X-rays, Gamma-rays, infrared and ultraviolet waves, most progressed radio telescopes that glean sound waves of the universe, either those that human ear can hear or those that human ear cannot.

Despite all these mighty giant telescopes and very sensitive devices and appliances, NASA scientists have recently admitted that the parts of the universe that may be probed do not exceed 4 percent of this universe.

Then where is the missing 96 percent of this expansive universe?

NASA scientists have recently admitted that 96 percent of the universe cannot be seen by eyes neither by most sophisticated scientific appliances, viz. their optical sense is weak and beaten, dull and discomfited, in a state worn out, despite all these giant scientific extensions.

The scientists in Imam Sadiq's days - 1200 years ago - knew nothing about these giant scientific devices. Therefore, Imam talked to them what suits their minds. He said:

"I do tell the infidel and the atheist, who does not believe in Almighty God, that Will is existent by itself. If he objects saying that Will does not exist by itself and that it is dependent on our existence, and if we would not exist, Will would not be existent also, I do tell him that Will is existing, we be or not.

As per the principle of wisdom, which is acceptable by

all wise men in the world, anything that exists does not perish, but its form is transformed. If he says that Will perishes after our death, I would give him an example:

Imagine a large tank full of water – or running river – supplying us with water at our homes, through a network of pipes connecting us to them.

If the network is disconnected, water would not reach us. Does the disconnection of this network of pipes prove that water is not existent in the tank or in the flowing river, from which we used to get water through pipes? Of course no! Since water in the tank or in the flowing river is there in its place.

Our existence in front of Will is similar to that network of pipes. The Will does not vanish after our death; rather the network of pipes are disconnected or removed. The Will is existent as it was always.

I do tell the infidel and the atheist that Will is Quintessence of Existence, and that Existence does become manifest in this world in visual, perceptible and tangible forms.

Whenever the Will intends to be manifest in visual and sensible forms it does become so. The Will and the manifestations thereof, in visual and sensible forms, are very close to each other, and are inseparable.

There is no objection to substitute Soul for Will, because Will and the manifestations thereof, in visual and sensible forms, differ not from Soul and Body.

But the infidel and the atheist would accept Will and the manifestations thereof more than Soul and Body."

In other place, he resumes saying:

"Will intended to create its visual, tangible and sensible manifestations, then there was this world, which we do see and we are part of.

From point of view of wisdom, this is the meaning of (His Command: "BE" and it is!). The Will intended to be and it was, and the visual, tangible and sensible world emerged and surfaced.

There is no difference between Will and this visual, tangible and sensible world, except that human does not see and perceive Will, but he does see and sense and feel the visual, perceptible, material, tangible, concrete and corporal world" – either by unaided eye or by human made tools and instruments.

Imam Ali says:

(If Almighty God wants anything to be created, he says (BE) and it comes to being. **His command is not in the form of an audible sound nor an audible call, but it is an action of formation.** He had no peer before Him, and if it was, it was a second God. It cannot be said: He came to existence after He was not existent, and ascribe to Him the created qualities.

There is no separation between creator and creation, and no favor of creator is on the creation. Then creator and creature are same, and innovator and innovation are equal.)

Contemplate and ponder on what Imam Ali has said quite candidly, and without any obscurity whatsoever:

"There is no separation between creator and creation, and no favor of creator is on the creation. Then creator and creature are same, and innovator and innovation are equal."

Contemplate also what Imam Sadiq has said quite frankly and without any obscurity whatsoever:

"There is no difference between Will and this visual, tangible and sensible world, except that human does not see and perceive Will but he does see and sense and feel the visual, perceptible, material, tangible, concrete and corporal world."

These great precious words in Divine Wisdom give the same meaning as Unification of Existence in Islam propagated by Mohieddin Bin Arabi, and also as Unification of Will in Existence in Islam propagated by us in this book.

This divine doctrine, or rather the divinity doctrine, adopts the big picture in which the creation melts and the creator emerges omnipotent, and there is nothing in the existence but God.

In other words, all the variables are wiped out and the stable lasting enduring permanent Monotheism stands.

This big picture is peculiar to the Men of God. It is not for an ordinary man in whom the creatures emerge and fill his eyes, whereas the Creator vanishes and almost dims in his eyes. It is for the Men of God in whom the Creator fills their eyes and souls and emerges like Day Sun, whereas the creatures vanish and almost dim in their eyes and souls.

An ordinary man may believe in God, but it is in his mind as an obscure entity.

As for the 96 percent of the universe, it consists of Dark Energy and Dark Matter, including mammoth Black Holes. **Dark Energy is equivalent to invisible Soul that cannot be seen, and Dark Matter is equivalent to**

invisible Layers of Soul which lie between the material world and the Absolute Soul.

God decreed them as seven heavens (one above the other) and adorned the lowest heaven with lights. Other six heavens He created from Dark Matter. Therefore, they are completely invisible.

Modern science has proved that dark matter does not respond to most modern advanced scientific devices and very sensitive tools and instruments, aside from our normal optic sense and other senses we have.

In other words, human being is completely incapable of sighting the 96 percent of the universe, whatever genius minds are used, and no matter what devices and instruments are used by them in the space observatories like Hubble, Chandra, XMM-Newton.

Imam Sadiq says:

"Same are our birth and death, because they are two faces of life. Birth does not deny the death. Likewise, death does not deny the birth. If we assume that birth and death to be two poles of a rod, then rod may be assumed as life and Birth and Death as its two poles."

Life and death that are two faces of **LIFE** are applicable to whatever is existing in the universe including stars, galaxies, and even black holes, a fact proved by the most modern science – if we are allowed to call the latest NASA space discoveries in the last two decades as the most modern science.

NASA scientists have proved that the dying black holes, in the throes of death, are the sources of cosmic rays, which puzzled the scientists for long time.

As per Annex 51:

"The study involved four **aged** galaxies that used to be among the brightest beacons in the universe but are now somewhat **worn out**. These former quasars, as they would have been called, might help solve a longstanding mystery about cosmic rays."

As per Annex 51a:

(In galaxies with so-called **quasar remnants**, the black hole nucleus is no longer a strong source of radiation.

"**Some quasar remnants might not be lifeless after all, keeping busy in their later years,**" Torres said. "For the first time, we see the hint of a possible connection between the arrival directions of ultra-high energy cosmic rays and locations on the sky of nearby **dormant galaxies hosting super massive black holes.**

Ultra high-energy cosmic rays represent one of astrophysics' greatest mysteries.

Each cosmic ray – essentially a single sub-atomic particle such as a proton traveling just shy of light speed – packs as much energy as a major league baseball pitch, over 40 million trillion electron volts. The particles' source must be within 200 million light-years of Earth, scientists have said, for cosmic rays from beyond this distance would lose energy as they traveled through the murk of cosmic microwave radiation pervading the universe ...

"The very fact that **these four giant elliptical galaxies are apparently inactive makes them viable candidates for generating ultra high-energy cosmic rays,**" Boldt said, adding that drenching radiation from an active quasar would dampen cosmic-ray acceleration, sapping most of their energy ...

"Ultra-high energy cosmic rays are extremely rare, striking the Earth's atmosphere at a rate about one per square kilometer per decade.")

Imam Sadiq had predicted the NASA scientific boom by saying:

"Yes, Oh! Jabir. Science has cycles of rise and fall as confirmed to us by history. Some epochs may come in future when scientific renaissances, revivals, booms, awakenings and progresses may emerge and come into play, when humanity would discern and realize the instruments by which the world (or life) is created."

In another place he says:

"As far as comprehension of tools is concerned, whereby the world (or life) is created, we are just like them, who lack some senses, smell not any odor and see not anything. In order to conceive them we need a stronger mind and require senses more than what we have."

Imam Sadiq is passing us on to the men of tomorrow, saying that they have stronger minds and more senses than we have today, by virtue of progressed devices and very sensitive tools and instruments that they invent and innovate.

Also Imam Zein-ul-Abideen is passing us on to future to infer and deduce the Divine Secrets in Sura Towheed for example.

But we are unfortunately stuck up with the past for everything, as if we are created to worship the dead past and to mummify the religion and shroud it with the shroud of dead men, unaware that human being is perpetually progressing; and his mind today is stronger

than the man of yesterday, and his senses more than in the past.

Exaggeration in sticking to the past is an unfortunate episode, and is in fact treason to the great religion of Islam and its evolution to a global civilization, overshadowing the western civilization.

The reason why we are stuck up with the past and why we slight the young generation and subsequent future generations is Disposition of course - habit rooted in our depths. We have formed habit from the very childhood to remember the past great men, their virtues, merits, commendable acts, feats and laudable deeds.

Disposition as mentioned in a later chapter is in endless circuit, like the donkey of water wheel or overshot wheel.

Even for a most advanced disciple it is the last curbstone - or what we have called in the past chapter as ISB - in his way to God, that keeps him in circuit, helpless to reach the **last resort of Salvation.**

It blocks his detachment from himself and association with God, unless Almighty removes his yoke and sends him outside the endless circuit of the water wheel.

This Disposition - **the yoke of nostalgia** - constitutes our religions and sects and colors them with its colors.

Koran 43.22:

(Nay! they say: "We found our fathers following a certain religion, and we do guide ourselves by their footsteps.)

Don't we say the same thing with our actions? The problem with us is that we think Holy Verses of Koran speak about

the ancient nations not about us, **unaware that nothing new is under Celestial Globe, and whatever is valid for ancient nations is valid for us too.**

As for our Imams, who say that men of future are stronger in mind and senses than we are (including themselves as well), they are of course free from the yoke of disposition and nostalgia, and are finally released from the ISB, to which they are not related whatsoever.

I wish we were free like them!

Most Moslems and even those who claim they are followers of these great Imams, all carry with them curb bit or Yoke of Bondage to the past.

The Yoke of Disposition is not that simple, since it is a group collective psychological yoke because of its social roots in the form of habits, traditions, rites, rituals prevalent in the respective societies.

The following holy verse indicates this collective group psychological disease which is applicable to them also, Koran 6.112:

"Likewise did We make for every Messenger an enemy, - evil ones among men and Jinns, inspiring each other with flowery discourses by way of deception."

It is no surprise that one of the Moslems may be considered as enemy of Prophet Mohammed if he disobeys God. Imam Ali says:

"Whoever obeys God is a friend of Mohammed even if he is not genetically related to him. Whoever disobeys God is an enemy of Mohammed even if he is genetically related to him."

Disposition is like accumulated roots or inter twisted twigs with thick thorns, under which people like to be overshadowed by them. There are scarcely any gaps to allow light to fall upon them. People defend the shadiness with all their powers and are not attentive whatsoever to Sun and its silver shining rays.

Most of them don't aspire to **liberty from self**; namely, to detach from themselves and associate with God and His affluent boons, favors and graces pervading the universe.

They mummify their religion and shroud it in the stories of the past dead. Whereas Almighty God does not cease to create, and He is the One who breathed from His Soul into the human in order to make him His successor on Earth.

He always calls upon us without cessation, appealing to us to always contemplate His Renovated Signs in His perpetual innovations and creations, as said by the Moslem French philosopher Roji Garodi[48].

Today we have attained extensions to our senses – or rather new senses - in the form of most progressed scientific devices and very sensitive tools and instruments.

Today we do use very powerful ground or space telescopes, and we do use very strong microscopes in our laboratories.

We have launched spaceships to the outer space and installed therein strong devices and sensitive instruments, which we control remotely, viz. we give them commands from the distance of millions of kilometers to execute certain tasks and perform certain functions.

---

[48] See the chapter under the name: (Roji Garodi adopted Islam and calls for renovation), at the advent of this book.

Recent discoveries about black holes[49]

Black holes are theoretical massive objects that pull nearby matter into their relatively small areas. Even light cannot escape their intense gravity. So researchers have never seen a black hole. They detect them indirectly by noting the gravitational effects on nearby stars, or by detecting powerful radiation given off by gas and other matter that swirls into the object – as per Annex 52a.

As per Annex 48:

"The classic view of black holes conjures images of gas and stars and **even light being swallowed.** That is why they are black. But when black holes feed, they create powerful high-speed jets that race at nearly light-speed into surrounding space.

Like a jolt of electricity breathing life into Frankenstein's monster, a black hole's jets can ignite star formation."

As per Annexes 48-48a:

" ... studied one of these jets slicing through a puzzling region of intense star formation known as Minkowski's Object. The jet, they say, **caused a dense gas cloud to collapse and trigger the star birth.**

The finding meshes nicely with a growing body of evidence suggesting **black holes are integral players in galaxy formation."**

---

[49] Black Holes constitute a part of Dark Matter.

As per Annex 48a:

"Some 20 years ago this kind of thinking was thought to be science fiction," van Breugel said, "It brings poetic justice to black holes because we think of them as sucking things in, but we've shown that **when a jet emits from a black hole, it can bring new life by collapsing clouds and creating new stars ...**"

In a telephone interview, Croft explained what's going on.

"The radio jet plows into a cloud of nearby gas in a supersonic shock wave, compressing and heating the gas. Gas in the cloud becomes ionized, meaning the atoms have lost electrons. After the shock passes, the ions recombine, creating radiation, which transports energy out of the cloud." Croft explained.

"The cooling causes the cloud to contract still further, and when a knot of gas becomes dense enough, it can collapse to form a star."

As per Annex 54b:

"Practically side-by-side in time discovered in separate observations made as part of the Sloan Digital Sky Survey, are compact but bright objects known as quasars. **These galaxies-to-be shine brilliantly because, researchers believe, each has a gargantuan black hole at its core whose mass is equal to a billion suns or more, all packed into a region perhaps smaller than our solar system."**

As per Annex 29:

"... from objects (black holes) **so dense a teaspoonful weighs a billion tons".**

As per Annex 31:

"For years scientists said the black hole (of our Milky Way) contained about 2.6 million times the mass of the Sun. They now believe the figure is somewhere between 3.2 and 4 million solar masses.

And a new study suggests all that **mass, confined to an area about 10 times smaller than Earth's orbit around the Sun, spins around about once every 11 minutes. The Sun, for comparison, takes about a month to make a revolution on its axis. Earth spins once every 24 hours."**

As per Annex 31a:

"Only hints of spin have been noted from super massive black holes, **each of which is thought to form and evolve hand-in-hand with the development of the galaxy in which it sits."**

As per Annex 31b:

"Theorists suspect other super massive black holes, some containing as much matter as a billion Suns, should spin ...

Because stellar black holes are smaller, **everything happens about a million times faster, so they can be used as a test-bed for theories of how spinning black holes affect the space and matter around them,"** Miller said.

As per Annex 42a:

"By these indirect observational means, Barger and other black hole experts learn something about what's going on at the fringes of a black hole, the beginning of the invisible realm, a region they call an event horizon. It is there where

things slip into oblivion."

As per Annex 42b:

(One theory – and this is not so farfetched by black hole standards – suggests there are five dimensions of space-time involved with a non spherical, rotating, donut-shaped "black ring". Other research, using computer simulations, shows that at the very least, the fabric of space-time is distorted around a spinning black hole ...

Perhaps the simplest distinction is this: A black hole can pack the mass of several suns into a region of space comparable to the size of a city.)

As per Annex 33a:

"Some black holes are formed by collapsed stars, but others are super massive, containing as much mass as a million to a billion suns compressed into a tiny region."

As per Annex 34a:

"As a black hole gobbles up gas, dust and even entire stars, the incoming matter gets so hot that it gives off high-energy radiation as it plunges into the hole. This energy includes X-rays, which are detectable by telescopes in near-Earth orbit."

As per Annex 44a:

"And even though quasars, or quasi-stellar radio sources, are the universe's most powerful sources of constant light, they are billions of light-years away. So even with the most powerful telescopes they appear as pinpoints of light. On top of that, the dust and gas lit up by a quasar makes seeing inside one a great challenge."

As per Annex 36a:

"But there may be a way to confirm their existence in the **gravitational shouts from their growing pains.**"

"Besides gas accretion, black holes grow in size by merging. When two black holes spiral into each other, **the final titanic clap sends out gravity waves - undulations in the fabric of space-time.**"

As per Annex 36b:

"They could potentially be a very significant source of gravitational waves."

As per Annex 37:

"Armed with cosmic speed guns and other high-tech devices, astronomers have witnessed amazing speeds around one black hole and an exotic wave in space-time careening around another."

"In one finding, a spinning black hole appears to create an orbiting wave. In a gross oversimplification, the process is similar to the wobble of a spinning top. The other study found evidence of hotspots - **perhaps blobs of hot gas the size of the Sun, or maybe regions lit by magnetic energy - traveling at 10 percent the speed of light.**"

As per Annex 37b:

(The data revealed matter orbiting the relatively small black hole hundreds of times per second, "glowing like light bulbs on a merry-go-round." ...

The effect seen can be described by frame dragging ... The black hole encompasses a region just smaller than the orbit

of Mercury. The blobs of iron gas are at a distance equal to the orbit of Jupiter. But unlike Jupiter's 12-year orbit, the blobs circle the black hole in a mere 27 hours ...

Both studies presented today are "pioneering results" that point the direction for future observations that could better pin down the physics of black holes.)

As per Annex 38:

"The scientists **claim to have seen space being warped,** as expected. They detected bright hotspots in small regions of an energetic disk of material that swirls into the black hole, **approaches the speed of light, and is superheated."**

As per Annex 38a:

"The new research looked at a galaxy called NGC 3516, which is thought to harbor a super massive black hole in its core, **which contains the mass of billions of Suns,** gas in this central region glows in X-ray radiation as it is heated to **temperatures in the millions of degrees** under the force of the black hole's extreme gravity."

As per Annex 38b:

"Imagine looking at a distant sand dune ... A familiar object on the dune, like a palm tree, could help you figure out the height of the dune and your distance from it. We have seen hotspots (trees) in the gas flow (the sand dune) around a black hole. Using these hotspots will enable us to map the curved space-time around a black hole and also measure the rate at which the space-time is forced to rotate with the hole, providing yet further tests of Einstein's general relativity."

As per Annex 39a:

" ... Our Milky Way contains a super massive black hole but the setup is not currently active in an active galaxy, a swirling disk of gas and dust, known as a torus, surrounds and largely obscures the central black hole.

The torus looks something like a donut. Inside it is a thinner disk of material, called an accretion disk that spirals in toward the black hole and is accelerated to a significant fraction of light-speed.

Black holes cannot actually be seen, because they trap all matter and light that enters them. But if an active galaxy is viewed from above, the hole in the middle of the torus allows a good view of the accretion disk, allowing astronomers to infer the presence of the black hole.

The new study looked at galaxies that were edge-on, but deduced the black holes by studying emissions in various wavelengths of the electromagnetic spectrum."

As per Annex 40:

"Researchers say the **collision likely triggered the formation of huge numbers of new stars, sent shock waves rumbling through inter galactic space,** and could eventually lead to the formation of a super massive black hole in the center of the combined galaxy, called Arp 200."

As per Annexes 41 and 41a:

"The new observations, released this week, are the first to accurately measure this disk of dust, called a torus. **It is about 11 light-years across and a surprising 7 light-years thick.**"

As per Annex 43a:

"Since no one has ever actually seen a black hole, how do astronomers even know there's one at the center of the Milky Way?"

Geballe offers up an analogy: "Around our Sun, the inner planets move more rapidly than the outer planets. By measuring those speeds, astronomers can calculate the mass of the Sun.

Likewise, astronomers observe that stars and gas near the center of our galaxy move faster than the stuff farther out. So some object has to be at the center, exerting a certain gravity that causes such speeds. This technique unambiguously shows a mass of 2.6 million Suns in a very small volume of space," Geballe says.

As per Annex 43b:

("From the small volume that this mass must inhabit, we know that the only physically realistic object that can have that mass is a black hole," he says.

Astronomers see all kinds of radiation emitted from the black holes in other galaxies – X-ray, infrared, ultraviolet, visible light and radio waves. The only signature of the Milky Way's black hole, however, is some radio radiation.

Ultraviolet and visible wavelengths are blocked by interstellar dust between Earth and the center of the galaxy. But the other wavelengths can penetrate this dust. Geballe says better instruments may be needed to solve the mystery.)

As per Annex 44:

"Astronomers have puzzled over quasars for decades before deciding each is a very active and developing galaxy most likely containing super massive black holes that formed billions of years ago. This cosmic yin-yang between the darkest and brightest space objects has made understanding quasars difficult."

As per Annex 44a:

(The researchers ... were only able to view the interior structures of the two quasars ... when a galaxy lined up between them and the Earth, magnifying their light – a phenomenon called gravitational microlensing. Like a Sumo wrestler rolling over and deforming a soft mat, the weighty galaxy dented, or curved, the fabric of space-time, rerouting and in this case focusing light from the quasars behind it.

The magnification allows astronomers to see quasars that would otherwise have remained invisible.

"Luckily for us, sometimes stars and galaxies act as very high-resolution telescopes," Kochanek said. "Now we're not just looking at a quasar, we're probing the very inside of a quasar and getting down to where the black hole is."

With NASA's Chandra X-Ray Observatory, coupled with measurements from optical telescopes, the astronomers were able to measure the size of the so-called accretion disk inside each quasar, one of which spanned about 14 astronomical units (AU), where one AU is the distance from Earth to the Sun.

"It's the first time anyone has measured the size of the disk around one of these black holes," Kochanek told SPACE.com.)

As per Annex 45a:

(Among the key findings from the survey was the detection of AGN in so-called "starbursts" galaxies with intense star forming activity. These discoveries will enable scientists to test a theory called "co-evolution," which states that black hole activity and star formation go hand in hand, the researchers say.)

As per Annex 47:

"Black holes love to feast. Among their favorite food is gas. Today, astronomers announced they've made the most detailed observations ever of giant clouds of gas very near a colossal black hole.

On the black hole's dinner plate was carbon monoxide. Some of it will almost surely be consumed, the researchers say. Scientists have struggled to observe these final stages of consumption, because black holes are far away and because the eating generates a lot of light that drowns out what's happening.

For this reason, the observations were made with a radio telescope."

As per Annex 47a:

("We have hints that some of the cold gas clouds may be moving toward the galactic center ... Meanwhile, the cool gas, arranged in a ring around the center of a distant galaxy, is likely the site of some pretty incredible star formation," Staguhn said.)

As per Annexes 49 and 49a:

(Black holes are high-gravity regions of space that suck in

every bit of matter they can grab, not even letting light escape. First postulated in theory early in this century, black holes have been the subject of intense study in recent years, and new data have erased most doubts about their existence.

Because they cannot be seen, black holes have always retained a certain mystery. In fact, much of the power they emit can only be traced through X-rays ...

"The big issue is whether the black holes really provide half the energy released in the universe, or a lesser amount," Maran said by telephone, **"Just the fact that this is a serious possibility shows how giant black holes have gone from hypothetical objects to possible major players in the universe as we understand it.")**

As per Annex 52a:

(Such direct observations, which would display radiation from the mysterious fringes of the black hole - an area known as the event horizon - would bring black holes out of the dark recesses of theory and into the realm of the known. The event horizon is thought to be the point of no return for black holes, a somewhat mystical virtual wall behind which the laws of physics are not understood and may be different from what is known.

"Proving that there is an event horizon means there is a part of the world that is separated from our physics," said lead researcher ... "We can't see behind this thing. We can't go behind this thing. And we don't know what's behind. It could be anything."

By tracing radiation, in the form of radio waves, emitted from all light around the black hole, Falcke and his colleagues expect the black hole itself will appear as a

shadow against the surrounding light ...

Simply, Falcke expressed the importance of the possible, eventual image of a black hole's shadow: "That would be the final proof that black holes exist. That defines a black hole. They are black.")

As per Annex 52b:

("I think we didn't realize before how close the technique is to detecting this shadow," Falcke says. "With the currently available resolution, we could 'see' from Berlin Germany, a radio source in Los Angeles the size of a mustard seed. Now we have to improve things to the point where we can image a dent on the seed." ...

"With the major observatories working together, and a further improvement of millimeter-VLBI, we should soon be able to actually image the shadow of a black hole. This would be the final test of whether black holes and event horizons exist," Falcke said.)

As per Annex 53a:

(These objects are among the most energetic in the galaxy ... Neutron stars contain the mass of the sun but are less than 10 miles in diameter, and they spin extremely rapidly – some as fast as 1000 times per second ...

"If you were to look at the sky with X-ray eyes it would be changing on all sorts of time scales. Almost every object out there would be flickering, either over fractions of a second, to seconds, to hours, to days, to years. And that's sort of the neat part about X-ray astronomy," he said. "You never know what you're going to see." ...

"Normally space, we picture it as flat," Rothschild

explained. "But as you get in close (to a black hole) it can actually twist. As the black hole is spinning maybe the space starts to go around the black hole a little bit instead of going straight into it." ...

The interpretation of the data is something that is a hot topic of debate among theorists, but with more data and analysis, scientists might actually be able to prove whether space and time are warped and dragged along by the edges of spinning black holes.)

Divine Manifestation

The relations of light with the black hole remind me of the relations of a man of God with his disposition, temper and mood. As light is trapped by a black hole, a man of God is likewise trapped by his disposition and mood. As light can escape capture and just be bent, likewise a man of God can escape capture of his disposition and mood. We will show hereunder this analogy:

As per Annex 42a:

"A black hole is like a one-way valve. When dirt is pitched into a hole in the ground, it stays there. Similarly, anything that enters a black hole stays there.

This incredible trapping effect extends to light, which is why we can't see a black hole.

But light passing near a black hole can escape capture and just be bent. That's one way scientists study and characterize the thing they can't see: They examine light coming from bright stars or galaxies behind a black hole, note how much it bends, and make inferences."

As per Annex 31a:

"**Black holes can't be seen or measured directly, because light passing near them gets trapped.** So Astronomers measure a black hole's mass by observing the orbital speed of nearby star."

As per Annex 33a:

"In a black hole, the force of gravity is so strong **that nothing, not even light, can escape.**"

As per annex 37a:

"**Black holes are so dense they can trap light.** They can't be seen, but astronomers find them by noting their gravitational effect on surrounding objects or by seeing X-rays and other radiation kicked up in their vicinity when gas is superheated as it swirls in at phenomenal speeds ... Any object with mass warps the space and time around it, in much the same way a heavy object deforms a stretched elastic sheet. **Light passing by a very massive star or galaxy can be noticeably bent, for example.**"

As per Annex 38a:

(The observations involve a spectral characteristic of light typically seen emitted around black holes, called a "broad iron K line." Turner and her colleagues determined that this spectral feature **is a result of strong gravity stealing energy from the light** ... "The observation rules out several competing theories attempting to explain the broad iron line," Turner said in a statement released today. "We find that Einstein's predictions ring true.")

Ponder the magnificence of God affluent in all universes, and how He has bestowed on us the genius of mind!

So glory to Him in Whose hands is the dominion of all things and He is Omnipotent. Glory to Him Who created most of the universe from dark energy, dark matter and black holes – all invisible and cannot be seen or discerned except by their effects on their surroundings.

Glory to Him Who has breathed into us from His Soul that cannot be seen, along with the invisible Layers of Soul which lie between our material body and the Absolute Soul.

Glory to Him Who created most of the first heaven from dark matter and dark energy, and the whole remaining six heavens from dark matter, and did not adorn them with lights so that they may not be seen.

Glory to Him Who made the attribute of disposition within us the last virtual barrier in our way to SALVATION, which is not penetrated except by an angel close to God or a prophet or a servant of God on whom He bestowed mercy from Himself and whom He taught knowledge from His own presence.

Soul in human corresponds to Dark Energy in cosmos. Layers of Soul in human correspond to dark matter in cosmos. Disposition in human corresponds to black holes in cosmos.

As the black holes trap the lights, disposition traps the men of God correspondingly. Nobody is to be reassured about his End till his last breath, and a man of God has to stick to the Sovereignty of God till the end of his life.

A man of God is not secure from Satan and the realm of his disposition, since little inclination to power and superiority may distract him from the path of righteousness and make him unworthy of the eternal happy life after death. Koran 28.83:

"That Home of the Hereafter We shall give to those who intend not high-handedness or mischief on earth: and the End is (best) for the righteous."

Disposition has the mischief as its essential part which comprises Overdoing or Neglect, exceeding the limits of moderation or falling behind the line of moderation, or as modern terminology calls them, Eagles or Doves, Hardliners or Softliners. What is exquisite for the men of God is the perfect line of moderation which is Virtue. Any inclination outside moderation is Vice.

High-handedness and proneness to superiority in a man of God may take the form of leadership.

Exceeding the limits in a man of God may take the form of exaggeration in traditional voluntary worship and to consider it as a religious duty. Falling behind in a man of God may take the form of losing sight of the Holy Target of his path.

Prophet Mohammed has recommended voluntary worship but on individual basis not on group collective basis – every individual as per his own respective method to reach the Holy Target of Closeness to God and His Holy Vicinity in an Assembly of Truth in the Presence of a Sovereign Omnipotent (see Koran 54.55) – I repeat to reach the target.

The voluntary worship with many is a mere tradition, wherefrom they attain deceptions, but never Closeness to God in His Holy Vicinity, because they are not marksmen or sharpshooters.

Almighty God says in Koran 37.164:

"Not one of us but has a place appointed (in the range of ranks)"

Voluntary worship for each individual is as per his appointed place (in the range of ranks), or as we call it in

the education of self-cognition (IRFAN), the special words of Remembrance of God (AWRAD) to be repeated by each disciple as per his capability, power and aptitude.

As for each disciple a unique place (in the range of ranks) is appointed by God, so it is imperative for him to cognize God and the heavenly secrets in his own unique way. Great Scholars of self-cognition had said: "Paths to God are numerous as the breaths of all creatures."

In the goblet of each disciple is his eternal wine that he should sip by himself, when he is silent listening to his deep self.

Nobody can announce to him except what is in the dawn of his knowledge.

Only in his tranquility can a disciple strike upon a treasure in the depths of his depths.

If That Home of the Hereafter is my reaping season then in which fields did I sow my seeds?

Did I strive for the Salvation of myself which had been shrouded with murky darkness?

Did I strive well until the tranquility, calmness and peace settled in my heart in the place of tyranny, vanity, pride, self-conceit and darkness, and until in the tranquility of my heart I probed for Lights of Salvation, Enlightened Wisdom and Eternal Secrets, and could set up my lamp in my minaret?

Verily the lamp is not mine, minaret is not mine, and the light which emanates from the lamp is not mine!

All bounties are in the hand of God: He granteth them

to whom He pleaseth: and God careth for all, and He knoweth all things (see Koran 3.73).

My Divine Self is like Ether that lifts only those who have wings. A man is created to work as a bird is created to fly and a fish is created to swim, as prophet Job said. Whoever loves life with a useful work, life reveals to him its depths and brings him closer to its deepest secrets. Life is murky darkness if it is without motion.

Let your wings move in the form of voluntary spontaneous worship. The best voluntary worship is to be preoccupied with your faults and vices away from those of others, to keep to your home, and to weep on your sins.

Imam Ali says:

"Blessed is the one who is preoccupied with his faults and misdeeds away from those of others. Blessed is the one who sticks to his home and weeps on his sins."

The shortest way to God is to be detached from all but God. As per the Holy Speech[50]: "Whoever is cut off from all but God, We do elevate him to glory and eminence."

The best prayer is to observe your breaths in full certitude, either in your wake or in your sleep. As per Imam Ali: "To sleep in certainty is better than to pray in doubt and skepticism."

The best mind is the mind of patronage not the mind of narration. How many are the narrators of wisdom and how few are the patrons of wisdom!

As per Imam Ali: "Understand some piece of knowledge with the mind of patronage not the mind of narration,

---

[50] Holy Speech is a collection of Holy Speeches from Almighty God brought along with the Prophet Mohammed from his Ascension Night to the Heavens.

since the narrators of the knowledge are many and the patrons are few."

The best faith is to thank God and be grateful to God, not only in words, not only in your psychological state, not only in your stabilized spiritual rank, standing and position, but your gratefulness to God should constitute a major, essential, vital and leading element of your interior mood and disposition.

God wants from us thank, gratitude, gratefulness, admiration and appreciation, and to advocate Him, patronize Him, champion Him, defend Him and support Him as much as we can.

As per Imam Ali: "Almighty God created us to thank Him with all our power, effort, toil, hard work, endeavor and attempt, and to advocate Him to our utmost capability."

The best supply and provision for your Afterlife is devotion, dedication, true intention, genuine purpose and righteous inner self.

As per Prophet Mohammed:

- "If you are dedicated to your religion, then little work will suffice you."
- "Be devoted to God, since God does not accept except pure devotion."

As per Imam Ali: "Almighty God admits whomsoever He likes to Paradise because of his true intention and righteous inner self."

If God bestows Mercy from Himself on a servant of Him and teaches him knowledge from His own Presence (see Koran 18.65) then this Divine Knowledge accompanied by

Divine Mercy grant him an oversight over the blights of inclination and proneness to:

- Superiority, glory and high rank,
- Overdoing, neglect and deviation from moderation,

And grant him power to reveal their realities and intricacies, in order for the servant of God to avoid them with the help of God.

Divine Knowledge and Mercy grant him also an oversight over the major blight in the human nature, i.e., **the Intriguing Stumbling Block (ISB)** in the way of an advanced disciple; namely, disposition involvement and continuity in the circuit and waterwheel of disposition, and his ignorance and unawareness that he is orbiting round and round like the donkey of the waterwheel, not capable of:

- Breaking out from this obsessing circuit,
- Passing beyond the zones of the heavens and the earth,
- Attaining a circuit breaker or as Almighty called it: "AUTHORITY",

To enable him fly lofty above heavens.

Almighty God says in Koran 55.33: "Ye assembly of Jinns and men: If it be ye can pass beyond the zones of the heavens and the earth, pass ye! Not without authority shall ye be able to pass!"

There are other things that should be observed by servants of God deeply dedicated to God, happy and tranquil in the Holy Vicinity of God in an Assembly of Truth in the Presence of a Sovereign Omnipotent (see Koran 54.55) in order to avoid Disposition and Habit Involvement and be free from the habit and disposition-centered states.

We have mentioned them in detail in our book called 'Seven Heavens' – all in Arabic poem – in the two chapters: 'Divine Manifestation' and 'Holiness of Vicinity'. Men of God are passing over a Straight Bridge where they are fully tested. If they succeed, they finally attain SALVATION – similar to the escape of light from the black hole. If they don't they collapse down – similar to the capture of light by the black hole.

Many men of God who have reached the high standing of faith, while passing over the Straight Bridge between:

- Hell and Paradise,
- Farness From God and Nearness to God,
- Departure from God and coming forward to God,
- Strangeness with God and the Vicinity of God.

Fall down from the bridge, not completing the path successfully.

It means they should target the nearness to God, coming forward to God and the vicinity of God, which is the selfsame paradise.

I repeat (target) or as God has said (intend) in his aforesaid Holy Verse "intend not high-handedness or mischief on earth" (Koran 28.83). If you (target) or (intend) God, all the way long, you would attain Salvation; otherwise, you shall fall down from the righteous bridge.

Some reasons for the collapse from the Straight Bridge are mentioned below:

- Their concern for things other than God.
- Confidential talk, secret conversation and intimate discourse with anybody except God.
- Aspiring to things, during their growth and

development, other than God.

- Inadvertence to remembrance of God (ZIKR).
- Carelessness to satisfaction of God.
- Long hopes in the earthbound decorated and adorned assets.
- Pride in transitory mundane assets.
- Disdain to bow down to God.
- Disdain of poor people.
- Remnants of tyranny in their souls even if little.
- Envy, vengeance and hatred.
- Concern about piling up money exceeding their needs, nobody benefiting from it.
- Competition in earthbound wealth which lasts and ends not except with their demise.
- Proneness to sexual pleasures outside the legitimate framework.
- Involvement in sexual whims and caprices.
- Vanities of igniting sex by sight temptations.
- Proneness to detraction, talking and hearing nonsense, indicating that there are already remnants of whims in his inner self, expressing themselves – tongue and audio temptations.
- Bragging of money, high rank, children, and of oneself – in pride, haughtiness and arrogance.
- Boasting of knowledge in pride and haughtiness as if they know something, unaware that God alone is knowledgeable and He abhors a partner, rather he doesn't forgive to have a partner.
- Unawareness that they are orbiting in endless circuit like the donkey of a waterwheel. Imam Ali says: "Worship without awareness is like a donkey of waterwheel". Their worship remains traditional and does not elevate them to a Holy Target of Perpetual Closeness to God, falling short of living continuously in Divine Vicinity under Sovereignty of God.
- Their involvement in ISB, Disposition and Habit, as detailed in the previous chapters.

How a man of God avoids failure

As mentioned in the previous chapter, many men of God who have apparently reached the high standing of faith, while passing over the Straight Bridge, fall down from the bridge, not completing the path successfully. Bridge is a test-tube of rightness!

As per Koran 29.2: (Do men think that they will be left alone on saying, "We believe", and that they will not be tested?)

They are exposed to a wide range of tests mentioned in the previous chapter, most difficult of which is the struggling and striving to pass over the Intriguing Stumbling Block (ISB) or disposition and mood in the human nature, and to escape from the gravitational well of Disposition and the strong powerful clutches of Mood, as light escapes from the gravitational well of the black hole and its powerful clutches.

The analogy between the Disposition in the human nature and the Black Holes in the universe can be discerned from the following:

As per Annex 37b:

"In observations by NASA's orbiting Rossi X-ray Timing Explorer, scientists examined the energy given off by iron gas. **The light waves were stretched as the light struggled to climb out of the black hole's gravitational clutches."**

As per Annex 38:

"Astronomers have watched a black hole drag on light trying to escape its surroundings, causing the light to lose energy just as Einstein predicted in his theory of general relativity ... Black holes pack lots of mass into a small region. Their gravity so intense **that nothing, not even light, can escape their clutches once inside a sphere called the event horizon.** Black holes can't be seen, but researchers study their surroundings to learn about them."

As per Annex 34a:

"Black holes are regions of space so dense, **not even light can escape their gravitational pull."**

As per Annex 44a:

"Black holes are so dense that nothing, not even light, can escape their gravitational clutches, making them impossible to observe directly."

Imam Husain says: "Oh God! How far am I from you and how near are you to me?"

Almighty God loves his servants: He is courting and flattering them whereas they show antipathy and repugnance to Him, He approaches them whereas they shun and avoid Him, He does favor to them whereas they offend Him, He shows them goodwill and intimacy whereas they reject it, as if they have the upper hand on Him.

The aforesaid bridge is sharp like a sword that cuts apart anybody of weight passing over it, if he is burdened with egoism, whims and caprices, however small they may be.

It is like hair causing loss of balance to anybody of weight passing over it, unless he is so light due to the **light pure soul of Salvation** that he carries within himself.

If one passing over the Straight Bridge is heavy due to his whims and egoism, however small they may be, he is torn apart by the Bridge which is like a sword.

If one traversing the Straight Bridge is light like the **lightness of a pure salvaged soul**, he would pass over the Bridge as he would pass over the hair due to his lightness.

If he has weight, however small it may be, due to an impure astray soul, he would lose his balance and his state of equilibrium over the Bridge which is like hair, and collapses down.

Yes, the men of God are like some lights which avoid falling into the black hole.

If Almighty God bestows Divine Manifestation on his servant, he sees himself like a crystal clear mirror, where he can sight the minute infinitesimal details of the blights that nest inside the inner self, by virtue of spotlights coming from the knowledge that was taught to him by Almighty from His own Presence (see Koran 18.65).

If Almighty bestows His Holy Vicinity on his servant, he sees none but God, seeks none but God, and loves none but God.

Everything else but God dwindles in his eyes. He sees God in everything. He dwells with nobody but God, albeit apparently he lives in this world and dwells with people.

He is in a world different from that of the other people, does not interact with people and nature surrounding him, since he is totally preoccupied with the Creator of people and nature and with the Designer of their matters.

Imam Ali says:

(All are submissive to His mighty magnificence, hearts shiver from His fear. So glory to Him on whom nothing is concealed:

- Not the dark dusk,
- Not the murky nights, in low grounds and in the black mountain peaks,
- Not the thunderstorms in the horizons of the sky,
- Not what the lightening falls on and illuminate,
- Not any single leaf detached from its place by gusty gales, neither removed by the showering rains.

He knows where each single raindrop falls and where it ultimately settles. He knows wherefrom each ant takes the seed and whereto it drags the seed. He knows how much it suffices a mosquito from its food. He knows what a woman carries in her womb.

He enters not into the things neither He comes out from them. He causes the information to reach you but not by tongue, He hears but not by ears and tools, He talks but not by words, He remembers but not by power of memory, He wills and He hides not, He loves and pleases but not by tenderheartedness, and He hates and gets angry without any difficulty.

The intentions and inward thoughts have appeared to those endowed with insight, the proof of righteousness is clear for those who make mistakes, and the signs are obvious for those endowed with vision and clairvoyance.

Oh God! You are the Eternity that nobody can probe. You are the End that nobody can escape from. You are the appointed time that nobody can be rescued from You unless You rescue him.

There is no moving creature but You have grasp of its forelock, and to You ends the fate of every human being.

If they sight the essence of what is hidden from them of You they would belittle their deeds and blame themselves.

One person takes not His attention away from another person, one sound distracts Him not from another sound, His favor to somebody causes not His plundering of another, His anger preoccupies Him not from mercy, and His mercy makes Him not inattentive to punishment. He created not the creatures with thought neither He took their help to ward off fatigue.)

All people are exposed to tests in this world, which is our free of charge big laboratory. But since most of them are heedless to self-cognition, they don't observe the tests that God lays in their ways.

Only people on the path of God preoccupied day and night by self-cognition, and having their inner self under the spotlight of their microscopic scrutiny, observe these tests, which they encounter in all ups and downs of life.

A man of God is exposed to many tests which are meant to cause him grow, advance, develop, progress, prosper and evolve to Perfection; in the meantime, exploring the intricacies and complexities of his expansive inner self, and work, toil and labor towards its improvement and his own completeness. He has to remain alert and wary of what is going on inside his Self.

Hereunder are few of them which he has to struggle and strive to avoid, except for the cause of God where true and genuine intention is purely cherished for Almighty God alone; in the meantime, learning a lot about himself and exploring the realm of self-cognition:

1 - Spite, grudge, ill will, bitter feeling, hatred, hostility, and all kinds of vanity: he has to liberate himself from them completely.
2 – Proneness to fame, esteem, high standing, or as Holy Koran has expressed: **"Intention of superiority on Earth and deviation from the line of moderation"**. It is imperative that he liberates himself from inclination to all forms of superiority, high rank, fame, esteem, and worldly glory, honor, prestige and high standing, and all kinds of deviation from the virtue of moderation.
3 - All kinds of love for the mundane world and all forms of pride, arrogance and haughtiness: it is necessary for him to detach himself from all forms of pride, arrogance and haughtiness, and dedicate himself to the Hereafter Life, uprooting adoration of the mundane world which is the root of all sins. He has to be totally humble and focused on his inner self, seeking after remnants of tyranny in his soul even if little, in order to improve the evil inclinations within himself.

4 - Focus on other people's faults: It is essential for him to focus on his own faults, vices, defects, imperfections, deficiencies, shortcomings and drawbacks, turning his attention away from those of others.

5 - Pretending religion by dressing in religious robes, whereas hiding proneness to superiority and love for power. Hypocrisy in religion – apparently practicing long prayers, growing long beard, big black spot on the brow, expressing religion but only by tongue, pretending Remembrance of God (ZIKR) but only by movement of

the lips, whereas hiding disbelief in God, the Hereafter Life, the Prophets, especially Prophet Mohammed: in contrast, it is obligatory for the man of God to adopt the Hidden Remembrance of God (ZIKR KHAFI), and to be an unknown obscure man of God, unnoted by people, live with people as if he is like them, nameless among them, not discerned by them for his closeness to God, and anything related to his special status in religion. For such people hypocrisy in religion has no sense whatsoever, because they seek none but God, and modesty and honesty is deep rooted within them.

6 - Adoration of whims and caprices: he should abstain from whims and turn away from caprices.

7 - False worship, apparently for God but actually for things other than God. The spotlight in the interior of men of God illuminates the minor and minute roots of false worship rooted in them, and they are hot in pursuit exploring them, hot at action uprooting them.

8 - Preoccupation with all but God and aspiration to anything in his development other than God: the Holy Vicinity prevalent in him drives him to intend God and God alone and nothing but God. Imam Husain says: "Oh God! You have wiped out all but You from the hearts of your lovers so that they seek none but You and resort to none but You."

Those men of God who don't fall down into the black hole of their disposition are in fact lovers of God, whom God loves so much as to wipe out from their hearts all but God, keeping their hearts pure and clean for God alone.

The big problem is with those who pretend that they are men of God, dress themselves in Godly robes, grow long beards and big black spots on their brows, just to deceive the common men, whereas they seek after superiority and all mundane benefits.

I wonder how they can remain stable on the Straight Bridge and don't collapse down to the Fires of Hell and to the black hole of their black disposition. History is brimming with examples of such people.

9 - Taking refuge to religion and religious clothes, compensating for inferiority complex arising from one's low social status: it is necessary for him that he should not pretend religion and take it as a veil to hide behind it his aspiration to superiority, since he cannot get it elsewhere. If he is really on the holy path to God he should seriously seek after the roots of inferiority complexes, which are imaginary and not real. God has set within us two paths[51]:

A - Gratefulness to God and Openness to His endless boons and graces.
B - Ungratefulness to God and Denial of Him and His Sovereignty and Veiling His boons and graces.

The epoch of life relating to the path B is rich in reproduction and growth of inferiority complexes. If he is now in the advanced epoch of life related to path A, i.e., gratefulness to God and openness to Sovereignty of God, he should work hard to uproot the irrational imaginary complexes multiplied within him during his dark epoch of life relating to Denial of God's Sovereignty and veiling and covering up His boons and graces.

The spotlight in the man of God has to be widely utilized by him to oversight these inferiorities spread here and there – if they ever exist – and expose them to God asking Him to heal them. He has to be totally preoccupied in self-cognition and comprehend his Self as it is in fact and reality.

10 - Adherence to the husks of religion: he should seriously

---

[51] Almighty God has quite expressly said in Koran 76.3: "We showed him two Ways: whether he be grateful or ungrateful (rests on his will)."

repulse the husks of religion from the idiot (religious scholars) and seek after the gist of religion with the men of wisdom.

11 - Disbelief in God, Hereafter Life, the Prophets and Men of God: it is deep rooted in the inner self of many hypocrite religious people, albeit they pretend religion and practice long prayers in order to deceive the common people.

They express religion but only by tongue, pretending Godly words (ZIKR) but only by movement of the lips, in order to deceive the common people and make them believe that they are men of God. I wish they examine their interior Self and explore the right path and true religion ! If they would intend the right path they would prefer to be obscure men of God. Apparently they don't, rather they intend superiority in the clothes of religion. I wonder how they can remain stable on the Straight Bridge! They can be discerned by their adherence to the husks of religion and their wrong presumption that religion is just turbans and long beards.

Such hypocrites are not concealed from the men of God and from their vision and clairvoyance. The spotlight within them gives them an oversight over the genuine, true facts and realities with regard to God, Hereafter Life and Prophets which fill them with certitude and certainty.

12 - Adherence to exterior forms of religion, turning back to the interior values of religion and facts and realities thereof: they don't understand except the exterior husks. Unfortunately, lack of awareness of the true values of religion with those who are clothed in the religious robes is the blight of religion. The big problem is that common men understand religion to be certain special robes and certain traditional patterns.

13 - Bad mannered albeit pretending religiousness: I don't understand how a strict inflexible adamant bad mannered man can pretend religion, whereas Prophet Mohammed has said: "I am sent by God to complete high manners". Where are their high manners to make them eligible for traversing the Straight Bridge?

14 - Racism against color, blood, nationality, tribe, language: their minds are fossilized. They can easily be discerned because they cannot hide their abhorrent racialism, rather they would brag. If they want to insult and disgrace somebody they will mention his nationality, color, language, tribe etc. despite the fact that Islam had wiped out all this racialism about 1400 years ago. I wonder how they can remain stable on the Straight Bridge!

15 - Accumulated stuff of some data and information which they call knowledge, driving them away from their **pure innate intuition**, and causing their farness from servitude of God, because they are stuffed with cheap knowledge that consists of certain data and information that cripple them from cognizing themselves and realizing their status in this affluent Creation. Is it not better that they give themselves some time to fathom and examine this cheap stuff with which they are inflicted?

Leap of Faith

Human beings enjoy capability of love and zeal for discovery, exploration and knowledge, which is a critical factor behind the dynamic power that drives them toward the scientific inquiries, researches and investigations.

They want to know everything about cosmos; and if they fail to have access to some secrets, few of them get frustrated, few get desperate and few remain stunned and confounded in front of these secrets.

If this frustration and amazement is the incentive behind their persistence to pursue inquiry, research and investigation, then it is excellent.

I am astonished about what is happening with the western scientists: they are bewildered with regard to the cosmic secrets, and that is excellent, but why they don't have the same standpoint in respect to the secrets of their own existence – the astounding human secrets?

Human is a divine secret walking on Earth, but he does not realize that. Is it not appropriate for him to remain perplexed with regard to his own secrets?

Of old, Socrates was calling upon the youth of Athens saying: "Cognize yourself!" Same did the prophet Jesus Christ. As regards the prophet Mohammed, he went one step further: he was encouraging the people to cognize themselves saying: "Whoever cognizes himself cognizes God".

If a human is determined to probe and fathom his own depths and seek to cognize himself, he will encounter in himself amazing secrets much more than those of cosmos.

In fact, human and cosmos constitute one living entity[52], whose elements interact with each other. They are one group! They are one bunch, one package and one bundle! What you see before you is one flock and one herd!

Don't you notice that all this interaction, all this concern, all this zeal, all this enthusiasm, all this ardor, all this fervor, all this eagerness, and all this glow, are because of this?

Don't you know that human is a part of cosmos? Don't you know that his ardent and passionate love to know the secrets of the universe is because this part belongs to that entirety and totality?

Human is a fruit of this big tree which we call "universe". He is the oak nut and acorn of the oak tree that we call "cosmos".

This fruit now is cognizant of that big tree to which it belongs. They are one tree, having one trunk, same twigs, same leafage and same fruits.

Most important is that if love and zeal for knowledge from this part (Human) for the details of that whole (Universe) exists, is it possible that this part will not have access to knowledge and cognizance of the details of the whole, and that he will not attain what he wishes and aspires at?

If love and zeal for knowledge exists on one side, it is sure and certain that he will attain what he wishes, and that knowledge is realizable.

---

[52] Please refer to a previous chapter named: "Cosmos as one living entity."

Don't you notice that whatever you have wished and aspired at from your childhood realizes gradually? **Wishes and aspirations are existential drive and impulse towards what you wish, and what you wish is realizable. It is a comprehensive package what exists between a human being and what he explores, searches for, inquires into and wants to know.**

The persistence of the modern science to explore the Unknowns of the universe, no matter how much it costs, and its perseverance to pursue it to the end, will not fail on the long run. It will certainly bear fruits.

The only problem is that the powers wielded to tackle science are insufficient. Mind alone is the power so far wielded, but it is not the only power in the human beings. They have other powers and capabilities within themselves that they should not neglect.

A Leap of Faith is indispensable! It is mandatory for the scientists to have FAITH in order to realize their wishes! Faith is a great power in the human beings. Whoever neglects it becomes short minded, frustrated on the long run.

How superb it is if science advances side by side with the Faith! In other words, if a scientist is a man of faith his work becomes easier, the outcome of his toil more guaranteed, tending towards tranquility, calmness, serenity, quietness and peace, avoiding a lot of unnecessary despair, frustration and dispersal of mind. Such a great power crippled by despair, frustration and internal dispersal is not expected to make breakthrough miracles.

Or as per Sweitzer's words in the Annex 57a-58a: "Comprehending this universe requires a leap of faith

into unobservable realms."

A scientist sitting at:

- His laboratory equipments experiencing, observing and sighting,
- His microscope scrutinizing very minute infinitesimal objects,
- His telescope observing the stars and galaxies,

Should know and cognize the Unified Will behind this expanse universe.

It is the same One Will that created in you, and in every human being, billions of cells, muscles, nerves, parts of the body and many other countless multitudinous boons, favors and graces.

It is the same One Will behind you and all your surroundings. The Will that created you, the universe and all the human beings is One Will, and we all belong to the same one principle and the same one source.

If we believe in the Unified Will in the universe and have Faith in One Will, then that is the **leap of faith. Ask your intuition if one will is better than many dispersed wills or not? This argument was used 3,200 years ago by the prophet Joseph while he was in Egypt.**

The one will that created in us love and ardor for knowledge, discovery and exploration has deposited within us comprehensive package of tools for investigation and inquiry, in order to fulfill our wishes and what we search for, which we should wield all of them and not suffice with a part thereof.

Is it not appropriate for the western scientists, particularly

NASA scientists, that Leap of Faith be ignited within them by the 96 percent of cosmos, which they have themselves admitted that it is dark and unknown and will remain dark and unknown, since it is not responding to the most modern sophisticated scientific tools and instruments?

The annexes have elaborated on the topic of dark matter (including black holes) and its effect and impact on the formation of stars and galaxies, their shape, cohesion and survival. Without dark matter the universe could not stand up on its feet, rather it would not exist as we know it today.

As per Annex 54:

"Yet this is the bright new picture of black holes and **their role in the evolution of the universe.** Interviews with more than a half dozen experts presently involved in rewriting the slippery history of these elusive objects **reveals black holes as galactic sculptors."**

As per Annex 54a:

... "**Black holes are shown to be fundamental forces in the development and ultimate shapes of galaxies and the distribution of stars in them ...**

Previously, black holes were seen as the endpoints of evolution, the final resting state of most or all of the matter in the universe. Now we believe black holes also play a critical role in the birth of galaxies."

As per Annex 54c:

"Demonstrations of co-evolution began to emerge in the mid-1990s when **researchers found hints that the existence of a significant black hole at the center of a galaxy was**

related to the galaxy's shape, says Martin Haehneit of the University of Cambridge. Only galaxies with a spherical bulge-like component appear to accommodate super massive black holes."

Dark Matter is also called Nothing since it is not seen and cannot be seen even by most modern human tools and instruments.

There is analogy between dark matter and the Layers of Soul, which also cannot be seen, and without them life could not exist. Soul and Layers of Soul are the only cause of the formation of life in the human being, his foundation, infrastructure, cohesion and survival. The parts of the body begin to be shaped as soon as the Soul is breathed into the embryo.

What the annexes talk about is called Nothing albeit it constitutes 23 percent of the universe.

However, there is another thing in the universe much stranger and more marvelous, which is also called Nothing. It is dark energy that constitutes 73 percent of the universe, about which the annexes have also elaborated.

Are all these wonders and marvels not sufficient to ignite Leap of Faith in the western scientists, particularly NASA scientists?

Disposition in Endless Circuit

Just imagine a star called (black hole) the size of an entire solar system! Weighing billions of Suns! Our minds cannot imagine such a weight!

Just imagine such a dinosaur in space! Can we compare it to the prehistoric dinosaurs which were occupying the Earth? I think our dinosaurs are like very small ants compared to this cosmic dinosaur! Or rather like very minute infinitesimal particles of an atom compared to it!

As per Annex 36:

"Though invisible, big black holes are not hard to find. Astronomers have noted evidence in the center of many galaxies for super massive black holes **weighing millions to billions of times our Sun."**

As per Annex 39:

"Super massive black holes hold as much matter **as millions or billions of suns.** The newfound black holes were long sought but went unnoticed because they lurk behind veils of dust and **are so far away that even the galaxies they anchor are difficult to examine in any detail."**

As per Annex 36a:

"The first black holes would originate out of the ashes of

the first massive stars. Like more massive quasars, **these gravitational monsters** would generate light by exciting gas that falls into their gaping maws. This light would have heated, or reionized, most of the gas in the universe."

As per Annex 37:

"The findings are among the most convincing ever of the incredible velocities and distortions that occur very close to black holes, and they help provide better estimates of the masses of the black holes. They also showcase a new method for getting an even better handle on **these gravitational behemoths."**

As per Annex 43a:

"Likewise, astronomers observe that stars and gas near the center of our galaxy move faster than the stuff farther out. So some object has to be at the center, exerting a certain gravity that causes such speeds."

As per Annex 33a:

"In a black hole, the force of gravity is so strong **that nothing, not even light, can escape."**

Mentioning **gravitational monsters and gravitational behemoths,** as aforesaid, and since human is a miniature of cosmos, such monsters and behemoths should be in humans also, swallowing everything even lights in the immediate neighborhood.

Something in human that corresponds to it is the human disposition, temper and mood that reign over us predominating even lights of men of God.

Sayyid Husain Aalim, the author of a book called "Majalis"

mentions the force of disposition, habit and mood that manages within its circuit all human deeds, movements, and thinking,[53] as follows:

(What causes a human to fall under the dark membranous veils of ignorance, devoid of metaphysical delights and jovialities, is his Soul that is confined under the piles of spiritual and physical masks and mantles, drawing veils over him gradually during his passage through different stages, descending ultimately to the state of shape, mold and form.

In the course of time, these masks and veils penetrate into him and take roots because of Disposition and Habit that perpetually manages within its circuit all his movements, deeds, acts, mode of speech, visions, opinions, views, thinking, reflections etc., emanating from his interior and emerging on the surface of his exterior, not halting because of the force of Disposition.

If a thousand true genuine men of God announce to him that he was once upon a time in the Holy World of God surrounded by Holy Delights and Jovialities, his mind would never believe it.)

Yes, there are certain Layers of Soul exposed to a black dark gloomy cloud of disposition, habit, temper and mood, drawing murky veils over them, until they are totally covered up in the piles of these dreadful clouds, consequently becoming coaly and sooty, acting in deep-black nights, moving in pitch-black darkness, not unveiling the thick masks and mantles that Disposition had drawn over them.

In modern science it is called "Subconscious Mind" and "Nervous and Physiological System", all of them

---

[53] See my book 'Model Scholar of Religion' page 399.

extremely active but in hidden and concealed mode like the dark matter.

Nobody has seen them but everybody succumbs under their tread and feels their impact and their effect on their deeds, acts, mode of speech, visions, views, opinions, thinking, reflections, etc.

In fact, it is the selfsame **Dark Matter,** from which the six heavens[54] - not adorned by lights - are made, and which pervades the whole universe and exceeds the normal matter by seven times.

As per annexes 2 - 2b and according to space.com dated June 30, 2005:

- (While there are many weird things in space, one of the **weirdest things is what is not there – the nothingness of the great black void. But what may be most strange about this nothingness is the possibility that it is in fact not really nothing, but rather a whole lot of something we just cannot see.**
-
- **White says we may never fully understand the nothingness of space, but with more sophisticated studies, we may eventually get used to the weird idea that nothing is always something.)**

As per annexes 3 - 3a and according to space.com dated January 5, 2001:

- (What is Dark Matter? This mysterious apparently invisible stuff that researchers think is everywhere is not easily understood.

- But in recent decades, researchers have become

[54] See previous chapter 'Gravitational Lensing in Koran'.

increasingly convinced that there is a vast amount of material in the universe that does not glow at all. This mysterious "dark matter" is believed by most scientists to be the most common stuff in the universe, perhaps making up 90 percent or more of the total mass.)

As per annexes 12 – 12a and according to space.com dated October 6, 2000:

- (The research suggests that, contrary to prevailing opinions in cosmology, none of the currently known or theorized particles of the physical world may be able to account for dark matter.

- Scientists are certain that the universe is made up mostly of a mysterious, undetected substance. The way that galaxies rotate and move around each other gravitationally indicates there is much more mass than what is seen and currently identified as stars, galaxies, nebulae and dust clouds. By studying these motions, astronomers have inferred the quantity and distribution of dark matter. **The obscure material is thought to float around in large blobs called halos, each of which is centered on a galaxy.)**

These blobs or halos of dark matter do exist in human beings as well, and they are called Layers of Soul.

It is obvious that you do feel the impact of these Layers of Soul on yourself and on your behavior and you succumb under their tread, you like it or not.

I mean it is Nothing but it is clearly Something.

Its dark awesome effects cannot be subdued and surmounted except if Almighty God takes you, embraces you, cuddles you and nestles you in His Sovereignty as He does with His Righteous Servants.

Imam Husain says: "Oh God! Kick out my devil and break my bet (or foreclose my mortgage)."

Firstly, he expresses his dignity of presenting such difficult handicaps to the Sovereignty of God, which you and I should learn.

Secondly, this attitude of his shows how much he is cuddled and nestled by Almighty God.

Last but not least, he is true, genuine and clairvoyant in describing our most complicated problem of breaking chains and shackles off our necks, or dissociating our necks from Fire of Hell, as we so often repeat in our prayers for days and nights.

We do repeat these prayers so often, but are we really serious, or we repeat like parrots i.e. by force of habit?

If we are serious then there should be signs and indications. The respective signs and indications are our holy perpetual celebrations of God's praise (ZIKR), perpetual inner repeat of the words of the remembrance of God (ZIKR KHAFI), our deep intimate discourse with God (MONAJAT), and our holy struggle and Jihad against Self.

If these indications are there we do feel this big problem within us; otherwise not. If we don't feel it then our prayers are no more than the voice of a parrot!

I address those who feel the impact of this **behemoth and monster** predominant over them, causing them nuisance, and those who show dire need for their SALVATION.

A disciple subdues and surmounts many handicaps in his path to God. He masters his thoughts, he attains certainty and conviction, he obtains calmness and tranquility, he

settles in his Enlightened Self, and finally he gets liberated from his intrinsic impediments.

It is imperative for him to conserve this state on a perpetual basis. If he remains stable and steady in this state till the day of his demise, he will certainly take along with him this enlightened, tranquil and happy Soul to the Eternal World in his Afterlife, since this state becomes his faculty, gift, aptitude, talent and his natural endowment and therefore an essential part of his entity.

We pray to God saying: "Oh God! Convert our bad state to your pleasant state." After much difficulty those who are true and genuine are endowed with the pleasant state of God.

But it is necessary that we should have this pleasant state of God on perpetual basis. That is to say, our mood should become Mood of God – a color of perpetual divine elevated state - and our changeable pleasant state should develop to a stable pleasant state of God.

This is the Face of God which Salman Al-Farsi and his holy colleagues of Al-Suffa[55] were seeking every morning and evening. Koran 6.52: "Send not away those who call on their Lord every morning and evening, seeking His Face."

The Godly State that may change is a good thing, but our relentless quest is to have a Godly State that is Perpetually Stable.

We seek a superb status that will never change; that is to say, we seek a Perpetual Godly Prestige and a Perpetual Divine Mood, and ask God to render us be from those

[55] Al-Suffa is an elevated platform still standing in front of the Prophet's tomb in Al-Madina. In Prophet's times, Salman Al-Farsi and his holy colleagues were always there worshipping God and calling on their Lord every morning and evening, seeking His Face. Afterwards it became a university, which is considered as the first university in Islam.

whom God describes in Koran 70.23: "Those who remain steadfast to their prayer", and from those who are in Perpetual Divine Enchantment.

As per the prophet Mohammed: "One Godly Enchantment is equivalent to worship of both worlds". Then why don't we settle on this Divine Enchantment and on this calmness, tranquility, peace and serenity? Why are we not in quest of a Soul reposing in complete rest and satisfaction as per Koran 89.27 to 30: "(O the righteous soul will be said) O (thou) soul, in (complete) rest and satisfaction! Come back thou to thy Lord, well pleased and well-pleasing unto Him! Enter thou, then, among my Devotees! Yes, enter thou My Heaven!"?

Why annoyance and vexation befall us every now and then? Whereas we think that we have subdued all handicaps? Do we think (idiotically) that we can change any of Godly Decrees by our nuisance and unsettlement, fretfulness and frustrations? Is fretfulness better than complete peace and satisfaction? Is it rational that we live in vexation, frustrations and unsettlement instead of serenity and satisfaction? Mind and ration says that complete peace is much better than internal disturbances and frustrations and that Godly Decree is much better than our internal rebellion against God, and that our annoyance harms us in the first place, and that our calmness and tranquility benefits us in the first place. I wonder why our essential and major part - Subconsious Mind and Nervous System - should live in irrationality!

Sometimes I ask some men of God, whom I know have progressed in the path of God: "Do you feel secure inside in the depths of your inner self and in your whole existence? Or there are still disturbances coming over your inner self embittering your existence?"

I ask them these questions not meaning intrusion or curiosity – God forbid! I just mean to prompt them to awake to themselves and see if they have the "Intriguing Stumbling Block" – ISB – inside them or not.

Embitterment, offence, grievance, distress, vexation, annoyance and disturbance afflicting your inner self means that some part of you is not grateful to God, whereas you are supposed to be fully, totally and wholeheartedly grateful to your God and consequently secure with all your existence. Not an atom in your existence, not a speck in your entity, not a shred in your inner self, should be in a position to rebel against God and be ungrateful and consequently insecure. This is exactly what we call the Intriguing Stumbling Block (ISB) in your inner self.

Imam Ali says: "It is my inner self that I do tame in piety so that it is secure and tranquil on the Doomsday, the Day of great panic.

Almighty God says in Koran 6.82: "It is those who believe and confuse not their beliefs with wrong – that are truly in security and they are on right guidance."

I say that it is difficult for you to detect in yourself the wrong, the injustice, the unfairness, the tyranny, the oppression, the despotism, etc., because most of it is injustice against yourself and without your awareness, whereas it is easy to detect if you are truly secure inside, i.e., to ascertain whether security, peace and tranquility are predominant and prevalent in yourself – in the totality of your existence – or not.

If remnants of grievance and distress are still lingering in your inner self, that means that the Gem of Faith inside you is veiled by injustice, tyranny, oppression etc. and

that the brilliance of this gem is dimmed by the darkness of injustice.

I ask this question in order to prompt the men of God to be attentive and heedful to ISB - the last obstacle in their way to God - and pay heed to ISB nesting deep in their nervous system and Subconscious Mind, open it wide in front of God, and present it to God in full humility and devotion, so that God may manage it Himself with His Sovereignty, as He does to His devotee servants.

If a man of God has subdued all the handicaps in his conscious life, it doesn't mean that he has overstepped the obstacles in his nervous, physiological and subconscious life.

How ecstatic it is if he cognizes this barrier in his inner self and starts to treat it with his holy war or Jihad against Self, perpetually remembering God, celebrating praise to God, adhering and clinging to God until the force of devil is dimmed and devil eventually surrenders to his Lord God, at the hands of the man of men, the Man of God!

As per the prophet Mohammed: "My Satan has surrendered to God - means has become Muslim - at my hands and God helped me to subdue it."

It is an eminent question, and if a man of God pays heed to it he will find its value surpasses that of the treasures of the world, and better than this world and all that it contains.

Why a man of God should fear Holy Struggle against Self, especially when he is free from his immediate tasks?

God commanded his apostle as per Koran 94.7-8: "When thou art free, labor hard (against self) and to thy Lord turn all thy attention." His apostle obeyed his Lord. You are

more entitled to follow your prophet than others.

Is not your ardent love for God sufficient to prompt you to more toil, hard work, effort, endeavor, pains?

If we say that most of your injustice is directed against yourself and without your awareness, it is because that it is rooted deep in your nervous system and subconscious mind in the form of false worship.

Uprooting all this may take years or decades, provided you embark Holy Struggle Against Yourself and perpetually Remember God (ZIKR), Celebrate His Praise (ZIKR) in full devotion; otherwise, it is impossible.

It is the ISB that I talked about in a special chapter in my book: Five Scholars of Self-Cognition. Overstepping it and subsequent SALVATION is the selfsame deliverance of my neck and your neck from mortgage and confinement, and from Fire of Hell.

It is the deliverance from the bet and the foreclosure of mortgage as cited by Imam Husain. **Believe me we are mortgaged and we should be foreclosed, in order for us to become free and liberated!**

Who has mortgaged us and against what?

Satan has mortgaged us and against the Yoke of our Disposition, **or the yoke of the donkey of watermill and waterwheel,** that we like so much. How much should we wail and whine on the threshold of Gracious Merciful God until we get relief, and the bet is released!

It is a big blight in the human nature. It is the ISB on the way of the man of God. It is the entanglement of disposition and habit, confinement in its circuit, revolving round and

round like the donkey of the watermill.

It is the veil of ignorance that causes the disciple to revolve and orbit the circuit, unable to break loose and find his straight way to God, free from intrinsic impediments.

The holy war or Jihad against the hidden false worship inside oneself takes a long time, since there exist various husks, masks and layers in a certain pattern of hierarchy, piling up on the Core Impurity, or RIJS as cited by Holy Koran, so that you cannot feel around your way through this mess of impediments towards the Core Impurity itself, because it preoccupies you for long years with its husks and masks.

Each husk and mask constitutes a big problem in your life, which requires Remembrance of God (ZIKR), celebration of certain Holy Words and praise to God (AWRAD) as well as holy war (JIHAD) against yourself that may last for months or years, in order to eliminate it from yourself, or rather God to release you from it.

If you don't embark a resolution to fight this hidden false worship - adoration of all concerns other than God - and the Chronic Impurity nesting deep in your inner self with all its husks and masks, one by one and step by step, then you have not yet started the holy war or Jihad against yourself.

The hidden false worship and the chronic impurity are the disposition, temper and mood pervading your nervous system and your subconscious mind, attracting you like the force of gravity to all concerns except the concern for Almighty God.

It is necessary that you look into yourself like a mirror, so that its delicate intricacies and its intriguing snares that work in concealment are not hidden from you.

I told you that most of the injustice that you embark is directed against yourself and without your awareness, and if you are not armed with **enlightened knowledge** the matter is going to be fairly difficult.

The hidden false worship – or hidden (SHIRK) as cited by Koran - and the chronic impurity – or (RIJS) as cited by Koran – are the forces of disposition, temper and mood impressed and embedded deeply in some Layers of Your Soul.

If you die taking along with yourself these smeared layers, then you will remain tormented, despite the fact that it is injustice made against yourself and without your awareness.

I wonder how you can be excused, since these smeared and contaminated Layers of Your Soul, either in your subconscious mind or your nervous and physiological system, are the essential parts of yourself – conscious or subconscious!

Is it not appropriate that you are armed with an **enlightened knowledge** that penetrates deep through the interiors of your Layers of Your Soul, which are Nothing but they are Something?[56] This book for example renders you such enlightened knowledge, then why not to benefit from it?

Don't you feel the impact of Layers of Soul and collapse under their treads? Is it not appropriate for you **to enlighten yourself with a knowledge that spotlights the obscurities of the secrets of the inner self, mind and soul that cometh by command of my Lord – See Koran 17.85?**

---

[56] Please read once again the scientific annexes 2-2b-3-3a-12-12a aforesaid in this chapter about Dark Matter.

O people! You are Souls albeit you move by your bodies. You are the life itself but you are also the veil, mantle and mask. When are the masks going to be unveiled so that the secrets of life rise from the horizon like Sun?

Most people toil with all their powers and exert tremendous energy, but they are unfortunately like donkeys of watermills and waterwheels rotating round themselves, breaking not away from their orbit around their smeared and contaminated Layers of Soul, free from all the intrinsic impediments, flying straightforward to the cuddle and nestle of Holy Vicinity of God.

If you are looking for a circuit breaker then seek enlightened knowledge and awareness. As per Imam Ali: "Worship without awareness is like a donkey of watermill". Also as per him: "How big is the loss of hardness followed by penalty, and how great is the gain of meekness with security from Hell!"

If you don't break away from Disposition, Habit, impure temper, negative mood and the hidden false worship – concern for all except God – then you continue to remain in your place. You think you have progressed forward, but at the end of the day you are stuck up where you are, not moving forward at all.

Also as per Imam Ali: "Those are cheated whose two days are alike." My Supreme Master, Sadiq Anqa, has said: "Breaking the habit is the best worship".

Look to it that you are released from the black hole of the Disposition and its tremendous force of gravity that keeps you orbiting around it.

Seek deliverance from the dinosaur of negative temper and mood sitting on your chest.

Embark a relentless quest to access a circuit breaker to break away from all intrinsic impediments, and enter the Sovereignty of God, pulling out from the sovereignty of Self and Egoism.

You must know that the infinite Sovereignty of God meets not with the finite sovereignty of self in one heart. Freedom from the captivity of self is not realized unless God enlightens you with His knowledge and awareness.

God is zealous and accedes not to the hidden false worship and adoration of any concern other than God, imparting it any value in your heart, neither concern for food, drink, dressing, nor concern for sleep, sex, money, sons, ranks etc.

If you sacrifice their value in your heart[57], remove them from the circle of your concerns, and eliminate desire for rushing towards them, they will rush to you with the best palatable sex, sleep, money, rank, sons, food, drink, clothing etc.

If you don't sacrifice you will always feel fretfulness, annoyance, vexation and unhappiness in sex, sleep, money, rank, children etc.

Don't you see that God has created man into toil and struggle? If you sacrifice in your heart all concerns other than God, and engrave Sovereignty of God alone in the interior of your heart, you will attain a sound heart.

As per Koran 26.87-88-89:

"And let me not be in disgrace on the Day when (men) will

---

[57] There is a big difference between sacrificing the value of something in your heart and having that thing. Most people including scholars and those knowledgeable make mistake about it. You can have the worldly treasures like the Prophet Solomon, but you must sacrifice any value for it in your heart like the Prophet Solomon.

be raised up - the Day whereon neither wealth nor sons will avail, but only those will prosper who bring to God a sound heart."

Then you become a divine bird flying through heavens, not perverted by lustful hunger and craving for women, neither by desire and appetite for prestige, glory, honor, wealth and sons, neither you hurry towards sleep, sex, food nor hasten towards praise, laudation, compliment etc. nor you have any interaction with nature whatsoever.

All the instincts that you possess God exhibits and displays in reasonable proportions but at the most ecstasy, pleasure, satisfaction and happiness, although you are not under the yoke of their influence, command, domination and sway, neither you hurry after their colors and adornments.[58]

You become from those whose limbs do forsake their beds of sleep, forsake their wealth and their selves, and even forsake their spouses and children, and from those who feel at ease with God and feel lonely with people.

Imam Ali describes them as follows:

"They shun the adornments of the mundane world that is dimmed in their eyes and enlarged in others' eyes, from which they are weaned in such a way as not to find in it any importance to speak about, neither they consider it as their settlement nor they wish to cling to it."

Self is like a child: if you leave it as it is it will continue on suckling. If you wean it, it will be weaned from nursing.

It is indispensable that at first you fix the targets that I

---

[58] Colors and adornments are adopted by the lovers of the mundane world in order to remove their fretfulness, frustrations, annoyance and nuisance that accompany their pleasures. If you throw the mundane concerns away, you will dispense with colors and adornments, because you will have the most ecstasy possible from your instincts.

have mentioned, and then perpetually strive and struggle to realize them at stages, one by one and step by step.

The knowledgeable is like a footballer, a sharp shooter, whereas the ignorant toils very hard but of no avail, and without outcome, results and fruits. Therefore, you will find so many religious gatherings, but no Salvation ever results from them.

Ignorant people are not concerned about outcome, results and fruits, since they have no fixed targets. They are concerned more about toil and hard work itself and brag about it. They are mere braggers!

A wrestler is not announced a "Winner" despite his hard endeavors and attempts. As soon as he subdues the foe he is announced "Winner". A team of footballers are not announced "Winners" despite their hard endeavors and attempts. As soon as the team subdue and outgoal their counterparts they are announced "Winners".

Likewise, in spiritual matters, whatever toil, endeavors and attempts you embark is not important; but if your Satan is subdued the angels declare your Salvation. Spiritual advance and progress should be measured by outcome and results, and not by mere claims and pretensions. If we do not do it here we are the losers, because Almighty God judges us as per our Salvation Standards. The problem is that Salvation cannot be discerned by common men who are the majority of our societies; it is discerned only by few – devotees and men of God. Majorities are usually cheated by religious claims and pretensions in their living day-to-day life. They may adore and admire Prophets and Imams because of their brainwash ever since their childhood. If they had lived in their times, most of them may have disdained them, prosecuted them, and more probably killed them.

Importance of Meditation and Prayers

The modern life is a life of greed and avarice, and the prevalent value after which the people are gasping is money. The majority of people are exploited to work for long hours without allowing time for rest, meditation and introspection, in order to satiate a profit-making culture in our modern society and the prevalent values thereof.

Therefore, there have recently appeared currents in the methodology of the modern business administration with the purpose of earmarking a special time for meditation and introspection during the working hours, which may help in alleviating the work tensions and keeping mental clarity and peace of mind, and consequently helping to improve working efficiency itself and subsequent augmentation of profitability.

Furthermore, on top of the necessities of the modern society arising from greed and avarice, prayer and meditation is a spiritual need in the human beings, which if neglected causes tensions in the soul and mind and lack of relaxation and peace of mind.

Of old, worship and meditation was embarked by man to regain peace of mind and tranquility of soul, and to cognize himself, improve himself, guard himself, get even with himself and get acquainted with his own faults and drawbacks, resorting to God to amend them.

Also some devotees from the old religions resorted to caves, mountains and hermitages to satiate this basic need in them for their self growing.

On the other hand, as far as practical life was concerned, man had other instincts and basic needs to attend. He had to work to feed himself, his spouse, his family and his children. He had to marry to satiate his sexual desires as well as to reproduce.

Therefore in Islamic Code Almighty has facilitated a pattern of life in which the spiritual as well as the instinctive needs together are satisfied.

It has entitled Moslems to work for their livelihood, marry, bring forth children, raise them and embark upon other basic material needs.

Simultaneously, it has given them sufficient opportunity for meditation, prayers, intimate discourse, secret conversation and confidential talk with their Lord.

Let your meditation be your liberation from earthbound pains, your detachment from space-time limitations and be your heavenly hymns, anthems and psalms.

The heart has seasons as fields have seasons. Let your soul even your mind with the seasons of heart, so that you have a wholesome, pleasant, healthy life, and the time passes on as sweet and limpid as a rippling brook flow crystal clear over white stones.

In your prayer and meditation, there are undulating gifts of heavenly scents and perfumes. So expose yourself to them and don't avoid them.

Don't let their abundant blessings miss you, because they

adorn the hollow dome within you with their brilliant lights, perfume your interior vast space with their sweet-smelling scents, play on the guitar of your heart their touching tender tones, fill your goblet with a Wine Pure and Holy, perfume your breaths with Psalms of the prophet David and fill your existence with a strange heavenly light as if it is some burning brand from a wonderful Divine Light.

If you embark upon prayer with the presence of heart and your prayer is transcendent, then the secret whisper of the angels never quit your ears and the sweet-smelling scents of the Kingdom of God never leave your breaths.

Prayer is not but the expansion of your Self in the living ether. Let your prayers cause you ardent and passionate divine love and give you access to the Holy Sacredness of the Sanctuary of your heart.

Embark upon your prayer at dawns and evenings, recite the secrets of your heart in the ears of nights. How wonderful if you present your naked Self to Almighty God and summon the jets of His Mercy in the darkness of nights and at the fringes of the days!

During worship handle your Self with kindness, gentleness, mildness and mercy, maximizing your prayer when your Self shows vigor, energy and activity.

How marvelous if you transcend over all that dies of you on Earth! How amazing if you take a chamber in the heavens, supplicating Him to guard you, embrace you into His Mercy, cuddle and nestle you and impart you His Guidance! He is Gracious and Generous and His Treasures diminish not no matter how much he bestows on His servants.

He who prays with longing, yearning, craving and

eagerness supplicates to God to spotlight for him all the mysterious secrets of his Self. He melts in the flowing watercourse that fills the ears of the night with its murmur and gurgle.

In the calmness of the prayers the hearts of those who pray cognize the secrets of days and nights. In the transcendence of prayer, that who prays becomes One, parting with his multitudinous Self.

In his lonely times a man prays and lives in peace with his Self, wherefrom springs the overall comprehensive peace and tranquility that pervades the entirety of his existence.

During prayer, the Soul and Layers of Soul smell aromatic perfumes and put on their most splendid and glorious jewels and ornaments. The transcendence of prayer converts your attributes to those of God, your actions to those of God and your existence to that of God.

Imam Ali says:

(Prayer causes your sins to fall down and scatter as leaves of trees fall down and scatter. It unties the rope of sins and their knots. Prophet likened it to a hot water fountain on the door of a man and he takes bath in it five times every day and night, then what dirt will he carry?

Few faithful knew its value; nothing distracts them from it, neither decorated assets of their wealth nor delights of their children.

Almighty God says in Koran 24.37:

"By men whom neither traffic nor merchandise can divert from the Remembrance of God, nor from regular Prayer, nor from the practice of regular Charity: their only fear is

for the Day when hearts and eyes will be transformed in a world wholly new."

Prophet was overtiring himself with prayer although he was given glad tidings of paradise. God commanded him as per Koran 20.132: "Enjoin prayer on thy people, and be constant therein." Therefore, he was enjoining prayer on his close relatives and he himself was constant therein.

Those few who remained awake from fear of Doomsday, their limbs forsook their beds of sleep, the while they called on their Lord in Fear and Hope[59], their lips murmured the praise of their Lord and were peeled off from their long apologies to their Lord for the sins they have committed.)

Soul is breathed into us by God. Layers of Soul are but essence and extract or a magnetic fluid prepared from Eternity to be food for the tree of heavens. Angels and the six heavens are made of Layers of Soul.

We are endowed with the Godly Breath and the Magnetic Fluid to become Holy and Sacred, whereas we have made ourselves profane. Sacred things are not worth profaning, and it is appropriate that we lay in every deed of us a whiff of our Soul.

Human is a flame of energy, if left without control he becomes dispersed and scattered and like a beast. If he well controls and puts himself together he becomes a pillar of light, tranquil, peaceful, composed and serene. Exactly like a flame of fire if left for itself it breaks up and becomes curse and if well controlled it becomes blessing.

In other words, if he does not attempt to pull himself out of the clutches of devil he becomes like a beast, whereas, if he attempts to put himself together in the path of God he becomes a Blessed Soul.

---

[59] See Koran 32.16.

Is Human Little Finite Creature?

Almighty God says in Koran 67. 3-4:

"He Who created the seven heavens one above another: no want of proportion wilt thou see in the Creation of God Most Gracious. So turn thy vision again: seest thou any flaw?

Again turn thy vision a second time: thy vision will come back to thee dull and discomfited, in a state worn out."

Let me pose a few questions as below in order to elucidate the human relation with the universe and whether he is able to dominate it or he is weak in the face of it, focusing of course on the pioneers of the modern science who are known for their zeal to explore the universe:-

1 - Is Human really finite, little, weak, frail, feeble and impotent?

2 - Did Einstein who reached the threshold of knowledge and awareness question once upon a time when he reflected deep upon the magnificent and superb cosmic system: "Is it possible that this wonderful system be without a creator!

3 - Did Newton who reached the threshold of knowledge and awareness say when he was in his eighties: "I feel as if I am a child playing with the sand on the seashore, whereas before him lay an ocean full of Unknowns?"

4 - Did the Elite NASA scientists, who have reached the threshold of knowledge and awareness, have delved so deep into the universe that their vision came back to them dull and discomfited, in a state worn out, as Holy Koran has mentioned?

The response is yes for all the questions 1, 2, 3 and 4!

1 - Human is really a little finite creature, weak and frail. Of course, I say what God has clearly said in the verse with which I have started this chapter and also as per Koran 4.28 at the end of the verse:

"For man was created weak."

Some may object saying there is apparently a contradiction between what you say now and what you have mentioned in your previous books where you have so often told us not to think that we are little specks and that a great world lay within us, and encouraged us to work and toil hard and embark upon a great Jihad against self for the purpose of Salvation.

Yes, if you are in a position to yearn for such an intrinsic great world within you, it means you know now how weak and feeble you are before God and in the face of this great universe.

Otherwise, most humans are proud and arrogant devoid from modesty and humbleness. Most of them are braggers and think too much of themselves, especially when they have some power, high rank, wealth etc. Almighty God says in Koran 96. 6-7:

"Nay, but man doth transgress all bounds, in that he looketh upon himself as self-sufficient."

They should cognize themselves as they are in reality, created like other creatures finite, weak, little despite their huge bodies, decorated offices, ornamented homes, abundance of their wealth and children.

They are really finite and little in front of the universe and much more before the Creator of the universe. They are in dire need of everything even the cheapest commonplace commodities like air, water, sunshine etc. in which animals and plants and even low, base and mean insects also take part. How dare those who are so needy look upon themselves as self-sufficient!

How weak and frail they are when encountering diseases, misfortunes and ordeals of life, much more when facing death and in the face of the Conquering God!!!

When some of them awake from their slumber and carelessness and come back to the cradle of modesty, and become heedful of their complete powerlessness, frailty, misery, humility and wretchedness, then the situation changes and necessitates another kind of address.

Those few who are no more inadvertent seek deliverance and Salvation and show longing and craving for such intrinsic capabilities, and therefore should be taught knowledge and wisdom to enable them tower over this great world hidden inside them and to comprehend the Hereafter.

A man shows signs of maturity when he becomes fully aware of his weakness and subsequently acknowledges truly and genuinely his frailty and misery, and becomes conversant with the fact that he cannot do anything, and he has to submit every single matter to his Creator and Designer, who has single-handedly taken the initiative to lead the Will throughout the whole universe, including

you little creature.

If this maturity is realized then he has approached the threshold of awareness.

2, 3 – Einstein and Newton have approached the threshold of awareness. In fact, maturity varies directly with the strength of mind and not with high education.

For many the more they are educated the more they become stubborn in their arrogance and self-conceit. As regards the Mind, the more its horizons open the more it overtops the Unknowns.

As mentioned by the NASA scientists - as aforesaid in previous chapters of this book - only 4 percent of the universe is observable by science. The rest 96 percent is an ocean of Unknowns, 23 percent of which is dubbed dark matter and 73 percent dark energy.

Both are called Dark because they don't emit radiation; therefore, it is absolutely impossible to see them or observe them, even with the most sophisticated scientific devices, tools and instruments, since they don't respond to them whatsoever.

Consequently, 96 percent of the universe cannot be recognized directly. They can be felt indirectly by their effect and impact on their cosmic surroundings.

Or in other words, these two relate to the world of Unknowns: nobody has ever seen them, observed them, watched them etc. and it is impossible to eye them, look closely at them, keep an eye on them, survey them etc. even by the most advanced progressed scientific appliances.

Therefore, it is imperative to have a Leap of Faith so

that we can have the complete big picture. Faith is not imagination or deception; it is rather a very strong tool within us which we should properly wield. Without Faith you cannot have the big picture.

It is quite certain that Einstein and Newton did not know during their lifetimes that the maximum of the universe that a man can ever observe, watch and scrutinize is 4 percent only.

Dark matter was assumed to exist in the 1930s but it didn't enter the streamline of science until the 4th quarter of the twentieth century. Likewise, dark energy was assumed to exist in 1997 but it was not confirmed until 2000 or 2001, when it officially entered the streamline of science.

Einstein and Newton were not there to be glared by these discoveries, but their minds were strong and their maturity certain and proven, and their clairvoyance very limpid and crystal clear.

They had the big picture and knew a Designer more learned than man and a Ruling Power much stronger than man. This is exactly the threshold of knowledge about which we spoke.

Will is One in this existence and it is the Will of God. The small tiny wills that we possess are not but little shreds endowed on us by Him just to test us.

If we think that it is our own genuine will, God entrusts us to ourselves i.e. to the finite little world of errors, delusions and deviation from the righteousness. If we cognize the only One Genuine Will in the whole existence, then Almighty God entrusts us to His Will, Wish and Desire.

As per Koran 11.56:

"I put my trust in God, my Lord and your Lord! There is not a moving creature, but He hath grasp of its fore-lock. Verily, it is my Lord that is on a straight Path."

We then brim with yearnings and cravings that He selects for us whatever He wishes, and blesses us in whatever He decides, and that His wish and decision for us cause us to dispense with our wish and decision, as Imam Husain said in his famous prayers.

You have noted how Newton admitted his weakness in front of this great Will when he announced his true and genuine feelings that he is like a small child playing with sand on the seashore, whereas before him lay an ocean of Unknowns.

You have also noted how Einstein expressed his weakness before the Creator of this wonderful amazing system in the universe[60], where he felt that he himself is not the creator of this system, but just an observer, and that this magnificent system has a Creator and a Designer who is certainly Great and Almighty.

Such spiritual standings indicate the following:

1 – Approach to the threshold of knowledge.
2 – Acknowledgement that what they know is just too little and the real genuine knowledge is that of Almighty God alone.

---

[60] What proves beyond doubt that the Will is One throughout the existence is that:
1 - The universe, which has an infinitely unimaginable huge size, and
2 - The atom that is unimaginably infinitesimal,
Both have same and similar system.

In the huge cosmos the planets rotate round the Sun, and the stars in a galaxy round their nucleus (the black hole). Likewise, in the infinitesimal atom the electrons rotate round the nucleus. Strangely, the space in the atom between the electrons and the nucleus is proportionate to the space in the cosmos between the planets and the Sun, or between the stars of a galaxy and their nucleus (the black hole).

3 – Their mood and mental state shows that they are grateful to God for the little knowledge and genius that they are endowed with.

This is exactly the Unified Will that dominates the universe.

Fatimah Al-Zahra, the Holy daughter of our Holy prophet, says in one of her prayers: "Almighty God does what He wants and He rules how He wills."

All that you watch in the universe – visible and invisible – is His Will and His wish.

4 – As regards the Elite from NASA scientists who have reached the threshold of knowledge, they have fathomed the depths of the universe and found that most of it, i.e. 96 percent is unknown and they have called it DARK. Or as per Koran's expression, they have turned their vision a second time: their vision came back to them dull and discomfited, in a state worn out.

In the remaining part of this chapter and in the next two chapters we will quote their latest findings. All scientists are not mature. Most of them are unripe and immature. Maybe the young scientists are more immature than the middle-aged scientists, but middle age does not always mean maturity, whereas young age does not always mean immaturity.

Almighty God says in Holy Koran: 37.164:

(Those ranged in ranks say): "Not one of us but has a place appointed."

That means each of us is unique and has a certain rank and an appointed place – a certain predetermined physical, mental, spiritual, nervous and physiological setup, and a

certain predetermined fate and message in this life.

As per Annexes 57-58 and 57a-58a of space com. article dated June 12, 2001, by Robert Roy Britt:

(There may be nothing more mind-boggling than the universe. Imagine we are halfway through 2001, in the heart of the Information Age, nearly 400 years after the telescope was invented and we don't yet know how big the big house is nor what, if anything, lies beyond.

"As much as we have progressed in science, we are still finite creatures with limited conceptual abilities and imperfect observational tools," said James Sweitzer, director of astrophysics education at the American Museum of Natural History's Rose Center for Earth and Space.

Humbling thought. But add one thing: We are highly curious creatures prone to speculation.

Keeping that in mind, we wanted to at least pose the questions that we suspect swirl through the minds of all who have ever been curious, who have ever looked up on a dark night and simply wondered.

How old is the universe? Does it have an edge? **And come on, truthfully - How could it all have begun in some "Big Bang" that originated in a spot smaller than the dots under all these question marks?)**

How did the universe begin?

As per Annexes 57a-58a and 57b-58b and 57c-58c:

(For answers, we pestered Sweitzer and Mario Livio, head of the science division at the Space Telescope Science Institute in Baltimore.

What a cosmic can of worms. Turns out even the word "universe" is elusive, having three meanings (two of which depend on whether or not you hit the shift key). So we start with the basics.

- What does the word "universe" mean?

The "observable universe," Sweitzer explained, "is the one astrophysicists generally talk about because it's the one open to empirical measurements. In fact it's the only one we can or ever will be able to talk with any certainty about."

He goes on to explain that "universe" (sans the word "observable") is a larger concept that scientists think "conforms to our laws of physics and all the assumptions that go with them." **"Comprehending this universe," Sweitzer said, "requires a leap of faith into unobservable realms."**

Finally, there is "the Universe," which, by virtue of its capital "U," includes "absolutely everything, even

possibilities of dimensions, modes and regions that obey laws of physics we don't know or maybe even can't know."

Okay then. If we can't know it, let's move on to the next question.

- How did the universe begin?

There is a very simple answer to this question: We don't know. And we may never know.

The leading theory for the formation of our universe is the Big Bang, of course. According to this theory, all the matter and energy in our present observable universe was compressed into a very small area, before, in a nanosecond, it exploded outward and expanded continually until the present time - and will perhaps do so forever.

Unimaginable as it might seem, the Big Bang theory is tame compared to some recently emerging wilder ideas, speculations that pop up like parallel universes in a vacuum of understanding.

Some cosmologists say our observable universe is one of many that spring forth continually from a series of bubbles. In this scenario, one Big Bang begets another.

Another recently proposed scenario holds that instead of springing forth in a violent instant from a teensy point in space, our universe was created when two parallel membranes collided. These "branes," as theorists call them, would have floated like sheets of paper through a fifth dimension until slamming together and generating energy and heat that led to the same expansion described by traditional Big Bang theory.

This Ekpyrotic Universe theory, as it is called, does not

replace Big Bang theory. Instead, it offers an alternative way that the currently observed expansion might have been jump-started.

In any case, the Big Bang theory does not actually explain how the universe began. It assumes that space, time and energy already existed. Accept that rather significant caveat and one can then discuss the leading theory for how our present observable universe came into being.

"It started from an extraordinarily dense and hot state, and it has been expanding ever since," said Livio, of the Space Telescope Science Institute, giving perhaps the world's most concise definition of the Big Bang model. But there's more to point out here, including the fact that "dense" is rather an understatement.

Everything that exists now, at least in the observable universe, was once all packed into a sphere one millionth of a meter across, Sweitzer said. Translation – too small to see.

"That may seem pretty small, but it's only because of our human perspective," Sweitzer assured us, adding that today's universe is "extraordinarily empty." Imagine, as an example, that the area of our solar system – with nine planets packed into a region less that 9 billion miles (14.5 billion kilometers) across – is relatively crowded compared to the vast empty stretches between stars, where nothing but a few molecules hang out.

"So there's lots of room to compact what we already see," Sweitzer said. "But there was a trade-off for all this miniaturization, like a car that's cheap to run but cramped to sit in. In the case of the universe, it was heat."

"Mighty hot," as Sweitzer put it, as in 10 degrees with 32 zeros after it.

Over time, the universe expanded, cooling as it did so. This expansion was discovered in the 1920s, when Edwin Hubble found that every galaxy he looked at, in any direction, was racing away from us. In fact, the Big Bang was initially suggested to explain this expansion.

Early on, things were smooth - real smooth.

But the expansion had a ripple effect of major importance, triggering lumps and bumps in the otherwise uniform fabric of space, which led to the birth of the first galaxies.

The Big Bang theory long ago predicted that an aftereffect of these ripples should exist today, throughout the universe, in a faint glow of radiation called cosmic microwave background radiation. This was confirmed in 1964.)

Our relentless quest is always to show you the way to the threshold of knowledge and awareness. We find now favorable grounds of opportunity for this important matter in this chapter and the one that has preceded it and the other one that will follow, and therefore I seize it.

I don't know anybody has entered the gate of knowledge and wisdom unless he has reached the threshold of this gate, which is not accessible except for those who admit their weakness, humility, misery and neediness before their Lord the Almighty God.

Bayazeed Al-bastami, a great historical scholar of self-cognition, says: (I heard a voice addressing me: "Oh Bayazeed! Our treasures are full of deeds of piety, devotion and dedicated services. If you seek us then come to us with things that we don't have." I asked: "Oh God! What are these things that you don't have?" Almighty God said: "They are misery, wretchedness, weakness, feebleness, neediness, humility, defeat and shattered dreams.")

You must know that nobody is allowed to enter the gate unless he has firstly reached the threshold of the gate, secondly knocked the door, and thirdly insisted, pressed, urged and persisted until eventually the gate opens for him.

Jesus Christ says: "Knock and knock and the door will open". Our prophet Mohammed says: "The door of the king is knocked by his servant until the door opens."

Prophets and the men of God are always preoccupied in wonder, amazement and astonishment from the Signs of God, whereas others take the position of ridicule and mockery. God says in Koran 37.12:

"Truly dost thou marvel, while they ridicule,"

God glorifies the quality of amazement in the Companions of the Cave[61] as per Koran 18.9:

"Or dost thou reflect that the Companions of the Cave and of the Inscription wondered about our Signs?"

God likes to see us in a state of maze - in His Own Superb World - and He exalts and dignifies this quality. As per Prophet this quality alone is equivalent to the worship of all Believers at all times.

If you are responding to His Signs and reacting with His Wonders, then you become stunned and astounded by them, and you spare no time for other things that may come on your way to capture your attention.

Whoever is in this high position how can he come down to the low position of vices and sins of ridicule and mockery?

[61] They were few high-rank Romans who became Christians in the first century AD. They escaped from the oppression of the pagan Romans to a cave in a mountain in the present Jordan, and slept there for 300 solar years and then awoke. Their story is detailed in Holy Koran.

I mentioned in my book: "Model Scholar of Religion" page 340 as follows:-

(Men of God are perpetually in amazement from the Wonders of God's Creation, not only those in the universe but also those available in themselves - amazement, surprise and bewilderment from the Wonders of Kingdom of God which are displayed before them like an open book.

God always shows them His Signs in the universe as well as in themselves, and they eye them in total astonishment. They are perpetually in the state of maze, a state honored by our prophet who described it as a worship equivalent to that of all Believers at all times. This is their valuable quality that never departs from them.)

Jawad Al-Khabori – the deceased renowned man in Oman – who was a disciple of my uncle Sayyid Hasan Al-Muscati, a great scholar of self-cognition, narrates that whenever he attended his session he asked him to recite Elia Abolmazi's poem, and he was reciting it, and the great scholar was interacting in ecstasy, melting in the amazement of Elia.

We cite here only one verse of his long poem: **"Oh Sea! In my chest rest wonderful secrets, but veil was drawn over them and I was that veil. Therefore, the nearer I come to them the farther I go away. Why I feel whenever I am on the point of cognition that I don't cognize?"**

This verse is expressing a great truth of self-cognition; namely, that human is the veil of himself, the closer he comes to his secrets the farther he goes away from them, because of this veil. He is committing the crime of injustice and wrong against himself.

The full long text of Elia's poem in Arabic is mentioned in our Arabic version of this book.

There are shallow hollow scholars in our religion as there are shallow hollow scientists. I remember in my childhood that one scholar from our religion wrote a poem in response to Elia Abolmazi, wherein at the tail of each verse he said: "I cognize" – in contrast to Elia who said: "I don't cognize". Is there a calamity bigger than that a man doesn't know and he doesn't know that he doesn't know!

There are also scientists from NASA who were fretted, upset, embarrassed and ashamed to know that 96 percent of the universe is not accessible to the modern science and its most sophisticated progressed advanced devices and appliances.

This 96 percent consists of dark matter and dark energy which are recently discovered by the astronomers – the scientists called them Dark simply because they know nothing about them.

Needless to mention that one's amazement and wonder springs from his acknowledgement of weakness before God. If a man is amazed by the Signs of God that means he admits his utter powerlessness before God.

It seems to me that Elia's poem (in Arabic language), on top of its sweetness, fluency, creativeness and wonderful ingenuity, is also a symbol of wonder and admission of human frailty. Otherwise, show me my friend one man who is ready to admit his ignorance and utter weakness and come forward and say: "I don't know"!

How old is the cosmos and is it finite?

As per Annexes 59-59a-59b and in continuation of Mr. Britt's interview with Sweitzer and Livio:

- How old is the observable universe?

(While some of the smartest scientists in the world have been working for decades to pin down an age for the universe, it's still an elusive number and subject to hearty disagreement. The most commonly cited estimates are between 12 billion and 15 billion years.

Estimates come by finding distant sources of light (a star or galaxy 10 billion light-years away is 10 billion years old). But the estimates also depend on the rate at which the observable universe is expanding, which in turn is related to its exact composition and evolution.

And evidence presented in the past couple of years (1999 - 2000) tells us the pace of expansion is actually accelerating. This unexpected discovery has only served to further confuse things, because no one can figure out what is causing this acceleration.

Researchers speculate that it might be the result of some strange and unknown matter or energy whose force of gravity repels, rather than attracts, over long distances.

All the confusion aside, Sweitzer, like any good scientist, has his own estimate of the age of the universe. "It's about

13 billion light-years from where we are to (the observable universe's) isotropic boundary, which is seen as the cosmic microwave background radiation."

As researchers push telescopic power to new limits, they have begun to see objects back to when the universe was just 2 billion years old or so. But they will likely never see the beginning.

"When we look in electromagnetic radiation (like light) we can only see the universe to the time when it was about 300,000 years old, because the universe was opaque to such radiation before that," Livio said.

So the universe is expanding, and it's been doing so for billions of years. And we can't see the beginning of it. All of which begs the next question.

- Is the universe finite or infinite?

"The observable universe is finite," Sweitzer said, "which is to say that it had boundaries – physical limits, sort of – It's a boundary to the events we can see directly, but not a boundary in the sense that New York State has a boundary."

And in an expanding universe, this boundary is constantly moving[62], as is everything within it. Cosmologists typically

---

[62] Imam Ali in his lecture about the **Formation of the Universe** cited, about 1400 years ago, three characteristics of the universe:

1- The rotational mode of the universe.
2- The universe has a moving ceiling i.e. the boundary of the universe is constantly moving.
3- The universe has an undulating fabric.

Sweitzer mentions the second character of the universe. Quite strangely, Imam mentions "the moving ceiling", or in the words of Sweitzer, the boundary of the universe is constantly moving, as is everything within it. Hubble discovered this truth in the 1920s, but Imam preceded him with this discovery by 1300 years. Before Imam it was the Holy Koran that discovered this cosmic truth. Koran 51.47: "With power and skill did We construct the Firmament: and We are certainly expanding (it)". Imam emphasized that everything in the universe is rotating e.g. planets, stars in a galaxy, galaxies, quasars etc. the same truth highlighted

invoke a balloon with spots on its surface, representing galaxies, to explain the expanding universe. As the balloon is inflated, the spots grow farther apart. If you stood within one of these spots, you'd see all the others moving away from you, and the most distant spots would move appear to move the fastest.

Sweitzer goes on to say: "The observable universe is probably part of a much larger universe which could be finite or infinite. Any global statements about the universe, such as overall extent, are speculative because they require extrapolating local mathematical theories and measurements beyond the observable universe."

So if the observable universe is finite, like the space occupied by a car or a house is finite, then there must be a brick wall or something up there, holding it all together - Right?

- Does the observable universe have an edge?

No, said Livio.

- **First you guys tell us the universe is expanding. Then you say it is finite. Now you say it has no edge! We need a visual here.**

Livio is up to the task. He dredges up the old expanding balloon as his pop. "An ant traveling on the surface of a balloon will never reach an edge," Livio explains. "In the worst case it will return to its starting point."

---

by Koran 21.33 end of the verse: "All (the celestial bodies) swim along, each in its rounded course." Also strangely, Imam mentions "the undulating fabric" which is the selfsame undulating space-time fabric mentioned by Einstein 1300 years after Imam. Einstein added the dimension of time to the three geometrical dimensions and called this combined dimension as "the space-time fabric" which he said is undulating in the forms of gravity; or rather, he linked Newton's "gravity theory" to this fabric. NASA scientists are hot at action now to explore this Undulating Space-Time Fabric around the black holes.

And so too do we return! It is now a few moments later in the same year, 2001, heart of the same Information Age, well after the telescope was invented, and we still don't know how big the big house is nor what, if anything, lies beyond.

But now, perhaps we understand what we don't know a little better.)

It is quite strange to find that the contagiousness of wonder and amazement expressed by Elia at the beginning of twentieth century has been transmitted to NASA scientists or the highest scientific circles in the world, but at the end of the twentieth century.

At the beginning of the twentieth century modern science was just at its adolescence age, and how much people all over the world were adolescent too and were bragging about the science and its ability to explore all the unknowns and mazes of the universe!

Science has in fact explored many of the secrets of the universe, but eventually, and after the scientists fathomed deep into the depths of the universe, they found what boggled their minds and let them swirl like an eddy.

Even in the eyes of the great scientists in the world, the holy two verses of Koran 67. 3-4 as below has appeared as an absolute truth:-

"He Who created the seven heavens one above another: no want of proportion wilt thou see in the Creation of (God) Most Gracious. So turn thy vision again: seest thou any flaw?

Again turn thy vision a second time: (thy) vision will come back to thee dull and discomfited, in a state worn out."

ANNEXES

For ready reference
(Mostly from space.com)

1 & 1a (2 pages): Physicists re-create primordial soup
Dated 18/6/2003 by Matt Crenson

2 - 2a - 2b (3 pages): Weirdest things in space: Black holes, neutron stars, accelerating universe, hyper nova, cosmic rays and more - NOTHING
Dated 30/6/2005

3 - 3a - 3b (3 pages): Understanding dark matter and light energy
Dated 5/1/2005 by Robert Roy Britt

4 - 4a - 4b (3 pages): Galaxies made of nothing? New theory of mysterious dark matter
Dated 5/1/2001 by Robert Roy Britt

5 & 5a (2 pages): Galaxies made of nothing? New theory of mysterious dark matter
Dated 5/1/2001 by Robert Roy Britt

6 & 6a (2 pages): New astronomical 'eye' to reveal the unseen
Dated 4/2/2000 by Wil Milan

7 - 7a - 7b - 7c (4 pages): Dark planets may orbit strange nearby objects
Dated 7/6/2001 by Robert Roy Britt

8 – 8a – 8b (3 pages): Scientists map dark matter, prove Einstein right
Dated 12/5/2000 by Maia Weinstock

9 – 9a – 9b (3 pages): Press Releases of 7/5/2010 by European Southern Observatory

10 – 10a – 10b – 10c (4 pages): Dark Matter exposed: Animation offers clues to cosmic mystery
Dated 15/4/2003 by Robert Roy Britt

11 – 11a – 11b – 11c (4 pages): First star in Universe born with help of dark matter, study says
Dated 15/11/2001 by Robert Roy Britt

12 – 12a – 12b – 12c (4 pages): Dark Matter Solution: Annihilating particles
Dated 6/10/2000 by Jack Lucentini

13 – 13a – 13b – 13c (4 pages): Studies pins down quantity, size of dark matter in universe
Dated 6/9/2001 by Robert Roy Britt

14 (1 page): Scientists closer to solving dark matter mystery
Dated 14/9/1999 by Patricia Reaney

15 – 15a – 15b (3 pages): Shall the WIMPS inherit the universe?
Dated 28/2/2000 by Wil Milan

16 – 16a – 16b (3 pages): Indian physicists blame dark matter clumps for worst mass extinction on Earth
Dated 23/7/2000 by space.com

17 – 17a – 17b – 17c (4 pages): Supernova found to confirm accelerating universe
Dated 3/4/2001 by Jeff Foust (from spaceflight now)

18 - 18a - 18b (3 pages): The expanding universe (from spaceflight now)

19 – 19a – 19b (3 pages) Dark energy confirmed: Shadow of mystery force seen in new study
Dated 5/8/2003

20 - 20a - 20b (3 pages): Weirdest things in space: Black holes, neutron stars, accelerating universe, hyper nova, cosmic rays and more – The Accelerating Universe
Dated 30/6/2005

21 - 21a - 21b (3 pages): Dark energy: Astronomers still 'clueless' about mystery force pushing galaxies apart
Dated 15/1/2002 by Andrew Chaikin

22 & 22a (2 pages): The Milky Way will never be the same
Dated 21/9/1999 by Ray Villard

23 – 23a – 23b – 23c (4 pages): Astrophysics challenged by dark energy finding
Dated 10/4/2001 by Ray Villard

24 & 24a (2 pages): New evidence that dark energy rules the universe
Dated 12/11/2002 by space.com staff

25 - 25a - 25b - 25c - 25d (5 pages): Dark Energy: Astronomers hot on trail of mysterious force
Dated 10/4/2003 by Robert Roy Britt

26 – 26a – 26b (3 pages): Dark energy tied to human origins
Dated 31/5/2004 by Robert Roy Britt

27 – 27a – 27b (3 pages): Rubber band invoked to explain dark energy
Dated 29/7/2004 by Robert Roy Britt

28 - 28a - 28b - 28c - 28d (5 pages): Probe could solve question of expanding universe
Dated 11/10/2000 by Jack Lucentini

29 & 29a (2 pages): The top 10 weirdest things in space: Weird and strange things in the universe
Dated 7/1/2001

30 & 30a (2 pages): Milky Way's central black hole captured by Chandra
Dated 6/1/2003 by NASA-Chandra X-ray Observatory center

31 - 31a - 31b (3 pages): New twists on the Milky Way's big black hole
Dated 24/11/2003 by Robert Roy Britt

32 & 32a (2 pages): Black hole closer to Earth than thought
Dated 15/12/2009 by space.com staff

33 & 33a (2 pages): Astronomers witness matter being sucked into black hole
Dated 16/8/1999 by Maggie Fox

34 - 34a - 34b (3 pages): Baby black hole with big appetite surprises scientists
Dated 29/8/2000 by Maia Weinstock

35 - 35a - 35b - 35c (4 pages): Pair of super massive black holes inhabit same galaxy, destined to collide
Dated 19/11/2002 by Robert Roy Britt

36 - 36a - 36b (3 pages): Early black holes may have heated the universe
Dated 18/4/2005 by Michael Schirber

37 - 37a - 37b (3 pages): Matter rides black hole's space-

time wave
Dated 10/1/2005 by Robert Roy Britt

38 - 38a - 38b (3 pages): The great escape: Scientists detect black hole slowing flight of light
Dated 26/6/2002 by space.com staff

39 & 39a (2 pages): Missing black holes found
Dated 28/5/2004 by Robert Roy Britt

40 & 40a (2 pages): Super massive black hole seen under construction
Dated 23/4/2002 by space.com staff

41 & 41a (2 pages): Swirling dust near black hole too thick for theory
Dated 7/5/2004 by Robert Roy Britt

42 - 42a - 42b (3 pages): The true shape of black holes
Dated 1/9/2003 by Robert Roy Britt

43 - 43a - 43b (3 pages): Weirdest things in space: Black holes, neutron stars, accelerating universe, hyper nova, cosmic rays and more - Our Milky Way's Black Hole
Dated 30/6/2005

44 - 44a - 44b (3 pages): Black holes power the brightest cosmic objects, study confirms
Dated 5/10/2006 by Jeanna Bryner

45 & 45a (2 pages): NASA completes survey of nearby super massive black holes
Dated 5/10/2006 by Ker Than

46 & 46a (2 pages): Black hole belts out discordant musical
Dated 6/10/2006 by space.com staff

47 & 47a (2 pages): Feeding the beast: Best view ever of black hole's dinner plate
Dated 9/1/2003 by Robert Roy Britt

48 – 48a – 48b (3 pages): Forces of creation: Black holes spark star formation
Dated 7/2/2005 by Robert Roy Britt

49 & 49a (2 pages): Black holes could be major power source
Dated 10/9/1999 by Deborah Zabarenko

50 & 50a (2 pages): Weighing black holes the easy way
Dated 16/9/1999 by Kenneth Silber

51 & 51a (2 pages): Spinning black holes may act like giant batteries
Dated 22/4/2002 by space.com staff

52 – 52a – 52b (3 pages): Researchers may soon view shadow of elusive black hole
Dated 15/12/1999 by Robert Roy Britt

53 & 53a (2 pages): X-ray spacecraft looking for twists in space-time
Dated 3/9/1999 by Greg Clark

54 – 54a – 54b – 54c – 54d – 54e (6 pages): The new history of black holes: 'Co-evolution' dramatically alters dark reputation
Dated 28/1/2003 by Robert Roy Britt

55 – 55a – 55b (3 pages): Twisted physics: How black holes spout off
Dated 17/8/2004 by Robert Roy Britt

56 - 56a - 56b (3 pages): New source of free energy fills universe
Dated 3/6/2002 by Robert Roy Britt

57 & 58 - 57 & 58a - 57 & 58b - 57 & 58c (4 pages): The universe: Still boggling the minds of 'finite creatures'
Dated 12/6/2001 by Robert Roy Britt

59 - 59a - 59b (3 pages): The universe: Still boggling the minds of 'finite creatures' - Part 2
Dated 12/6/2001 by Robert Roy Britt

Total = 59 articles composed of 169 pages (Annexes). Next is the original text of the 59 articles numbered appropriately as above for reference purposes.

Annex 1

SEND TO A FRIEND

Physicists Re-Create Primordial Soup

By Matt Crenson
Associated Press
posted: 06:30 pm ET
18 June 2003

UPTON, N.Y. (AP) -- Physicists said Wednesday they had created a new form of matter strongly resembling the stuff of the universe one-thousandth of a second after its birth.

This matter is called quark-gluon plasma and physicists believe it is key in understanding both the dawn of the universe and the interior of atomic nuclei.

"The matter we have created has properties that have never before been observed," said William Zajc of Columbia University, one of hundreds of researchers working on the project at Brookhaven National Laboratory.

Whether this new matter actually qualifies as the long-sought quark-gluon plasma is an issue for debate, but all of the

Annex 1a

scientists who heard the evidence agreed that what they've seen so far looks good.

"There is still work to do," said Peter Jacobs of Lawrence Berkeley National Laboratory, who expressed hesitation about the findings.

He and his colleagues have submitted three papers describing their results to the journal Physical Review Letters.

Quark-gluon plasma offers a glimpse at both the birth of the universe 13 billion years ago and the incredibly tiny realm inside atomic nuclei today.

Since its birth, the universe has gradually cooled from more than 100 trillion degrees to today's relatively frigid conditions. As temperatures fell below about a trillion degrees, quarks and gluons went from a free state into the confines of protons and neutrons. By reversing that process, even for only an instant, physicists hope to learn how it occurred.

Similarly, smashing apart gold atoms could shed light on how quarks and gluons arrange themselves inside protons and neutrons, and how those bigger particles in turn form nuclei.

At Wednesday's presentation, the researchers described experiments in which gold atoms were accelerated nearly to the speed of light and then smashed together. These collisions were so violent that the debris they produced briefly reached temperatures of one trillion degrees centigrade, the hottest and densest conditions ever created in a laboratory.

Brookhaven's Relativistic Heavy Ion Collider, or RHIC, was built to smash atomic nuclei so violently that their most fundamental components _ quarks and gluons _ are liberated from their normal tight confinement and momentarily released into a seething hot soup. The amount of energy required to produce that transformation is so high that it has almost certainly not existed in nature since the dawn of the universe.

Three years ago, physicists at Europe's CERN physics laboratory announced that they had seen fleeting signs of quark-gluon plasma in the aftermath of collisions between lead nuclei. But many physicists dismissed the claim as unconvincing and a full scientific paper was never published.

At 10 times the energy of the CERN lead collisions, RHIC's gold experiments offer a much better opportunity to produce and study the new realm, said John Harris, a theoretical physicist at Yale University.

"At this highest energy we're seeing characteristics that are much like what we expected," Harris said.

Other physicists cautioned that the Brookhaven experiments have not yet shown that the new matter has all the characteristics of a quark-gluon plasma. It clearly has sufficient density, Jacobs said. But so far the experiments have not shown that individual quarks and gluons are floating around in it completely free of their nuclear constraints.

Annex 2

SPACE.com Science

News SpaceFlight Science Technology Entertainment SpaceViews NightSky Video Community

SEND TO A FRIEND

advertisement

Weirdest Things in Space: Black holes, neutron stars, accelerating universe, hypernova, cosmic rays and more

posted: 30 June 2005
07:30 am

NUMBER 1

Nothing

While there are many weird things in space, one of the weirdest things is what *isn't* there – the nothingness of the great black void. But what may be most strange about this nothingness is the possibility that it is in fact not really nothing, but rather a whole lot of something we just can't see.

"The nothingness of the vacuum has come under theoretical scrutiny the past

SPACE Community

Become a Space.com Member

Log In | Join Now!

Annex 2a

century, and what appearsmost plausible, and most fantastic, is that space is filled with a seethingfroth of virtual particles," says James C. White II, executive director ofthe Astronomical Society of the Pacific. "And space itself? At thesmallest scales we can consider, it may comingle with time in a foam ofspace-time."

TOP 10 Weirdest THINGS IN SPACE

Agree with the list? No? Uplink your views!

White describes this"foam of space-time" as ubiquitous events, all defined by theirpositions in space and time. If empty space could be photographed, we'd see asea of virtual particles that spring into existence and disappear.

This ultimate small worldis thought to be composed of "particles that come into existence out ofseemingly nothing, from the very energy of the vacuum itself, that exist fortimes so short that their being does not seem to violate the law that says youcan't make something out of nothing," White says.

Researchers are justbeginning to knock on the door of this weird, small world.

learn more

See theWhole List (Start with #10)

Weird Fact
"It's embarrassing that 90 percent of the universe is unaccounted for."
-- English astronomer Martin Rees.

More About Nothing

Albert Einstein, in presenting his special andgeneral theories of relativity, was the first to suggest a fourth dimension,called space-time.

"Einstein went on to say that matter and space affect oneanother," White says. "Matter, which must exist in space --like a pencil or a snail or a galaxy -- bends space." Gravity is the forcethat does the bending.

White likens the concept to pushing an inflated balloon with yourfinger. The dimple you create is similar to the effect that all matter has onspace.

Related Information

Big Bang Theory Warmed by Ancient Heat Discovery

Annex 2b

"If you shine the beam of an incredibly bright flashlight past theedge of the Sun and off into space, your friend on the other side of the Sun willsee that the light's path is bent a bit toward the Sun, which causes a dimplein space-time," he explains. "In a more extreme example, if you shineyour flashlight very near the edge of a black hole's event horizon -- theregion inside of which even light cannot escape -- your friend will see thatlight beam bent by a huge extent."

White says we may never fully understand the nothingness of space, butwith more sophisticated studies, we may eventually get used to the weird ideathat nothing is always something.

Returnto the Main Weird Page Seethe Whole List (Start with #10)

1 2 3 4 5 6 7 8 9 10 |>> Continue with this story >

Evidence of 'Big Bang' Gas Found at Galactic Center

Cosmic Yardsticks: Pulsing Stars Unlock Universe's Secrets

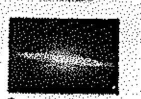
Dark Matter: Shall the WIMPs Inherit the Universe?

VIDEO: Voyage Through the Cosmos

Other Weird Things

How Gravitational Waves Lead to Space-Time Ripples

Gravitational Waves: Einstein's Elusive [Chi]ldren



The Space Top 10s

Vote for your Space Favorites

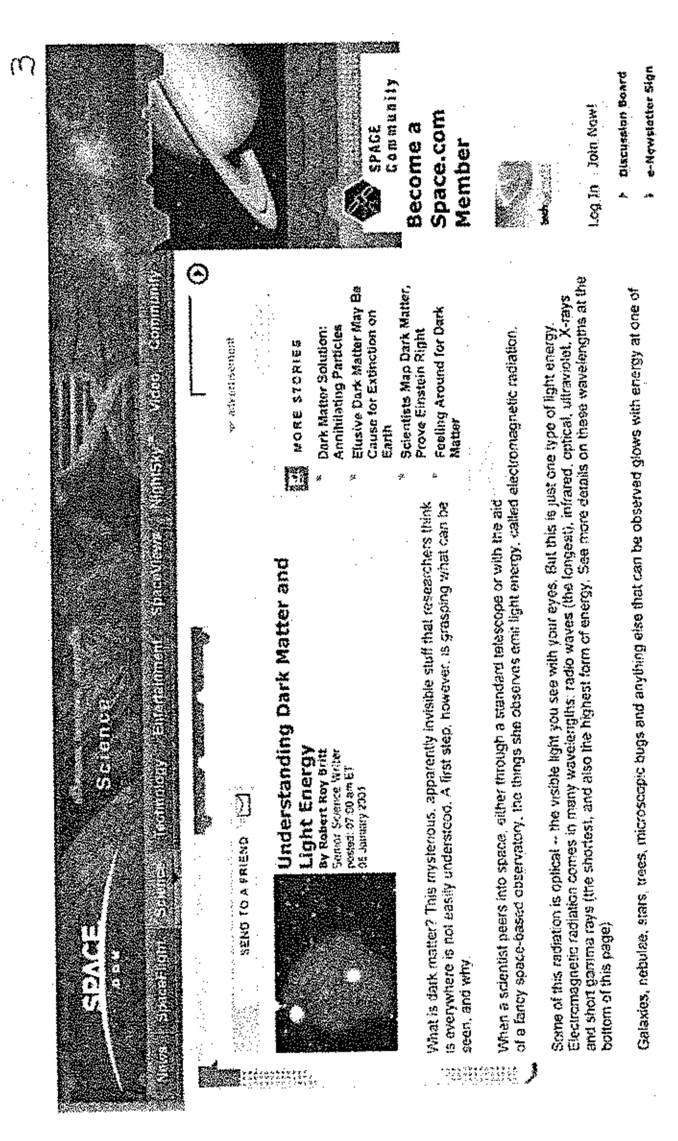
Space Trivia

Multimedia Features

SPACE.com Reader Favorites

Space Wallpapers

Annex 3



SPACE.com -- Understanding Dark Matter and Light Energy

Page 1 of 6

3

SPACE.com Science

News | SpaceFlight | Science | Technology | Entertainment | SpaceViews | NightSky | Video | Community

SEND TO A FRIEND

advertisement

Understanding Dark Matter and Light Energy

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
05 January 2001

MORE STORIES

* Dark Matter Solution: Annihilating Particles
* Elusive Dark Matter May Be Cause for Extinction on Earth
* Scientists Map Dark Matter, Prove Einstein Right
* Feeling Around for Dark Matter

SPACE Community

Become a Space.com Member

Log In : Join Now!

- Discussion Board
- e-Newsletter Sign

What is dark matter? This mysterious, apparently invisible stuff that researchers think is everywhere is not easily understood. A first step, however, is grasping what can be seen, and why.

When a scientist peers into space, either through a standard telescope or with the aid of a fancy space-based observatory, the things she observes emit light energy, called electromagnetic radiation.

Some of this radiation is optical -- the visible light you see with your eyes. But this is just one type of light energy. Electromagnetic radiation comes in many wavelengths: radio waves (the longest), infrared, optical, ultraviolet, X-rays and short gamma rays (the shortest, and also the highest form of energy. See more details on these wavelengths at the bottom of this page)

Galaxies, nebulae, stars, trees, microscopic bugs and anything else that can be observed glows with energy at one of

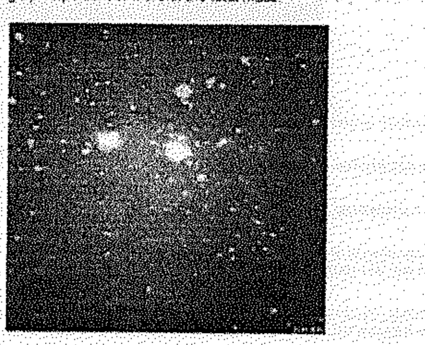
...astronomy/dark_matter_sidebar_010105.html

26/05/31

Annex 3a

these wavelengths.

But in recent decades, researchers have become increasingly convinced that there is a vast amount of material in the universe that does not glow at all. This mysterious "dark matter" is believed by most scientists to be the most common stuff in the universe, perhaps making up 90 percent or more of the total mass.



Researchers say the Coma Cluster of galaxies shows effects of gravity that can only be explained by the presence of some unseen dark matter.

Dark matter does not emit enough energy to be directly detected. But indirectly, researchers note its presence. Anything that has a mass exerts the force that we call gravity. Dark matter -- or something that we have yet to find -- exerts a gravitational pull on objects in and around distant galaxies, and even on light emitted by those objects, say scientists at NASA's Goddard Space Flight Center.

By measuring these mysterious effects of gravity, researchers determine how much "extra" gravity is present, and hence how much extra mass, or dark matter, must exist.

In large clusters of galaxies, for example, scientists say that five to 10 times more material exists than can be accounted for by the stars and gas they find.

So what is dark matter made of? No one knows for sure.

Annex 3b

Normal matter -- you, your computer and the air you breathe -- is made of atoms, which are composed of protons, neutrons and electrons. Scientists call this "baryonic" matter. They suspect some dark matter is of the normal, baryonic variety. This might include brown dwarf stars and other objects that are simply too small, or too dim, to be seen from great distances.

But most dark matter is thought to be non-baryonic -- truly strange.

If this is true, then just finding the stuff will be difficult, because researchers don't even know what they are looking for.

Wavelengths of light (Electromagnetic radiation)

- **Radio:** Wavelengths longer than infrared and very low energy.
- **Infrared:** Wavelengths longer than the red end of visible light and shorter than microwaves (roughly between 1 and 100 microns). Little infrared radiation reaches Earth's surface, but some can be observed by high-altitude aircraft or telescopes on tall mountains.
- **Optical/Visible:** Electromagnetic radiation at wavelengths visible to the human eye. We perceive this radiation as colors ranging from red (longer wavelengths about 700 nanometers) to violet (shorter wavelengths about 400 nanometers).
- **Ultraviolet:** Wavelengths shorter than the violet end of visible light. Earth's atmosphere blocks most ultraviolet light.
- **X-rays:** Very short wavelengths and very high-energy; X-rays have shorter wavelengths than ultraviolet light but longer wavelengths than gamma rays.
- **Gamma rays:** The highest energy, shortest wavelength electromagnetic radiation. Usually, they are thought of as any photons having energies greater than about 100 keV (kiloelectron volts).

SOURCE: NASA/GSFC

3



The Space Top 10s



Vote for your Space Favorites

Space Trivia



Multimedia Features

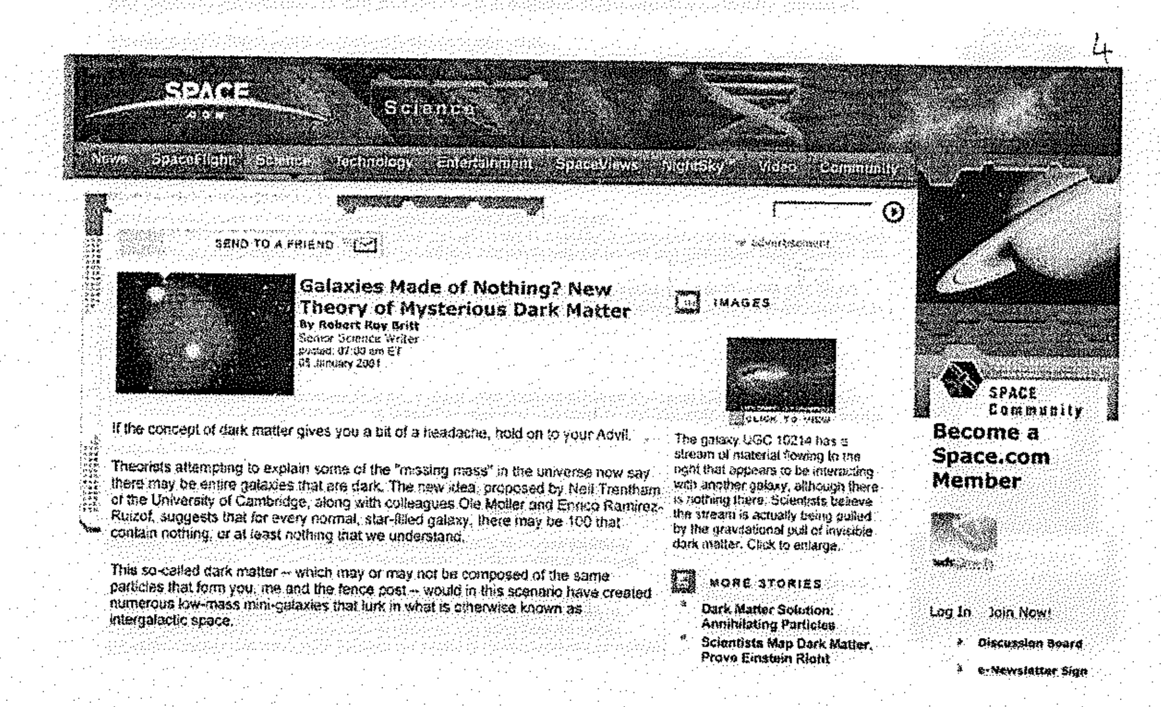


SPACE.com Reader Favorites



Space Wallpapers

Annex 4



SPACE.com -- Galaxies Made of Nothing? New Theory of Mysterious Dark Matter — Page 1 of

News SpaceFlight Science Technology Entertainment SpaceViews NightSky Video Community

SEND TO A FRIEND

Galaxies Made of Nothing? New Theory of Mysterious Dark Matter

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
05 January 2001

If the concept of dark matter gives you a bit of a headache, hold on to your Advil.

Theorists attempting to explain some of the "missing mass" in the universe now say there may be entire galaxies that are dark. The new idea, proposed by Neil Trentham of the University of Cambridge, along with colleagues Ole Moller and Enrico Ramirez-Ruizof, suggests that for every normal, star-filled galaxy, there may be 100 that contain nothing, or at least nothing that we understand.

This so-called dark matter -- which may or may not be composed of the same particles that form you, me and the fence post -- would in this scenario have created numerous low-mass mini-galaxies that lurk in what is otherwise known as intergalactic space.

IMAGES

CLICK TO VIEW

The galaxy UGC 10214 has a stream of material flowing to the right that appears to be interacting with another galaxy, although there is nothing there. Scientists believe the stream is actually being pulled by the gravitational pull of invisible dark matter. Click to enlarge.

MORE STORIES

- Dark Matter Solution: Annihilating Particles
- Scientists Map Dark Matter, Prove Einstein Right

SPACE Community

Become a Space.com Member

Log In Join Now!

- Discussion Board
- e-Newsletter Sign

http://www.space.com/scienceastronomy/astronomy/dark_galaxies_010105-1.html 26/05/3

Annex 4a

Trentham explains that many large galaxies are known to be accompanied by smaller galactic partners. But in some instances, as many as 100 small galaxies cluster around a large one. Existing theories of dark matter predict that there should be many more such clusters, Trentham says, but observations don't find them.

"Hence the expectation that many dark galaxies exist," Trentham said in an e-mail interview, suggesting that "very few stars -- perhaps none at all -- have formed in them."

* Shall the WIMPs Inherit the Universe?
* Readers' Choice: The Weirdest Thing in Space is ...

A paper on the idea will be published in an upcoming issue of the *Monthly Notices of the Royal Astronomical Society*.

Cautious response

Alan Dressler of the Carnegie Institution of Washington said dark mini-galaxies may well exist, but don't expect a bunch of undiscovered Milky Ways to be hanging out in space. Dark galaxies would be a hundred or even a thousand times smaller than our own galaxy.

[inset]

Dressler, who was not involved in the new work, studies galaxy formation and evolution. His work led to the discovery of the "great attractor," a huge concentration of galaxies and invisible matter that seems to tug at our Milky Way galaxy.

"The bulk of the dark matter [in the universe] is probably associated with the [known and detectable] bright galaxies, and is known to be there," Dressler told SPACE.com. "But this is still an interesting hypothesis that for the dark mini-galaxies, the dark-matter substructure does not have stars accompanying it in all cases."

Dressler said it would be fascinating to learn that there are more dark mini-galaxies in the universe than there are larger, normal galaxies. "By number, I'll bet there very well could be," he said, stressing that their mass would not be terribly significant, however.

Morris Aizenman, of the National Science Foundation's and Physical Science Directorate, called the new idea intriguing, but he cautioned that more study is needed to determine its merits.

"Everyone agrees that there is a significant amount of dark matter in most galaxies," Aizenman said. "But the *real* question is why a galaxy would be composed *entirely* of dark matter."

Dark matter was first suggested six decades ago as a way of explaining curious motions in the cosmos. Figuring out what it is, and exactly how much exists, would be an important step toward understanding how galaxies form and whether or not the universe will continue expanding forever.

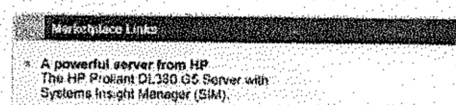
Annex 4b

Though not yet seen and not even proved to exist, dark matter gives itself away by gravitationally altering the movement of galaxies and stars. For example, matter near the center of most galaxies moves so fast that some unseen mass must exist at the center, pulling things inward. And even the path of light from distant objects is skewed by material that cannot be found.

In large clusters of galaxies, five to possibly 10 times more matter exists than can be accounted for by the stars and gas scientists can find.

Next page: A possible smoking gun.

1 2 3 | >> Continue with this story >



The Space Top 10s

Vote for your Space Favorites

Space Trivia

Multimedia Features

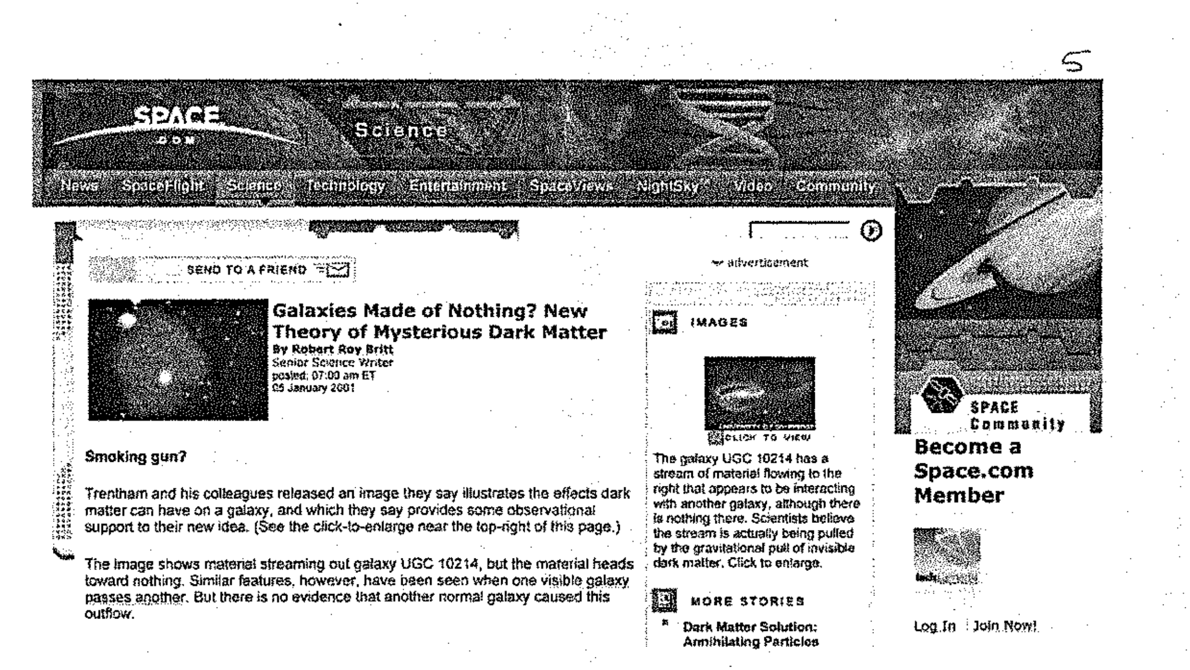
SPACE.com Reader Favorites

Space Wallpapers

Annex 5

SPACE.com — Galaxies Made of Nothing? New Theory of Mysterious Dark Matter

Page 1 of 5



News | SpaceFlight | Science | Technology | Entertainment | SpaceViews | NightSky | Video | Community

SEND TO A FRIEND

Galaxies Made of Nothing? New Theory of Mysterious Dark Matter

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
05 January 2001

Smoking gun?

Trentham and his colleagues released an image they say illustrates the effects dark matter can have on a galaxy, and which they say provides some observational support to their new idea. (See the click-to-enlarge near the top-right of this page.)

The image shows material streaming out galaxy UGC 10214, but the material heads toward nothing. Similar features, however, have been seen when one visible galaxy passes another. But there is no evidence that another normal galaxy caused this outflow.

advertisement

IMAGES

CLICK TO VIEW

The galaxy UGC 10214 has a stream of material flowing to the right that appears to be interacting with another galaxy, although there is nothing there. Scientists believe the stream is actually being pulled by the gravitational pull of invisible dark matter. Click to enlarge.

MORE STORIES

- Dark Matter Solution: Annihilating Particles

SPACE Community

Become a Space.com Member

Log In | Join Now!

http://www.space.com/scienceastronomy/astronomy/dark_galaxies_010105-2.html

24/12/30

Annex 5a

"The most realistic alternative possibility," Trentham said, is that "somehow this material has been gravitationally pushed out of the galaxy by some unknown mechanism."

Aizenman called the image a possible smoking gun.

"It's an unusual shape. Clearly something has happened there," Aizenman said. "But I think we need more evidence. You can't do it all on the basis of one image."

- Scientists Map Dark Matter, Prove Einstein Right
- Shall the WIMPs Inherit the Universe?
- Readers' Choice: The Weirdest Thing in Space Is ...

Trentham and his colleagues agree. And they have some ideas for how more evidence might be found. But the methods depend on whether dark matter is composed of stuff we know -- protons, neutrons and electrons, or stuff we don't.

If dark matter is made of known particles, then improvements in existing observing techniques might root much of it out. Brown dwarf stars, for example, are thought to be nearly as prevalent in the universe as real stars. But few of these failed stars have been found, likely because they are small and dim.

In infrared wavelengths and with space-based observatories, more brown dwarfs could be detected. The same could be true for black holes, the researchers said. And if dark matter is normal matter, then a dark galaxy might act as "gravitational lens," distorting the appearance of distant galaxies.

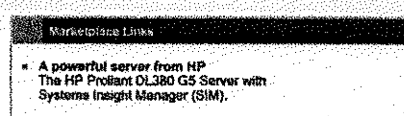
But if most dark galaxies are made of matter that we don't yet understand, then they may remain no more than a prediction for some time.

Even gravitational lensing would probably not be able to detect small dark galaxies.

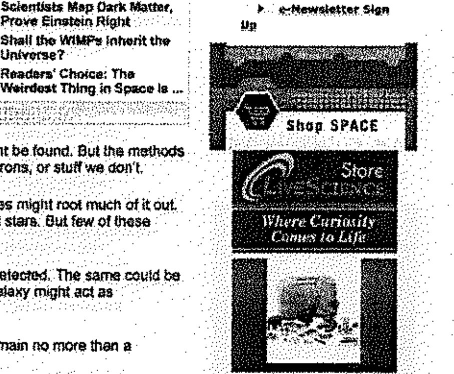
"We're pretty much in the dark about whether there are lots of those things or few of them," said Dressler, of the Carnegie Institution. "We just don't know yet."

Next page: Trentham answers some complicated questions

1 2 3 | >> Continue with this story >



▸ Discussion Board
▸ e-Newsletter Sign Up

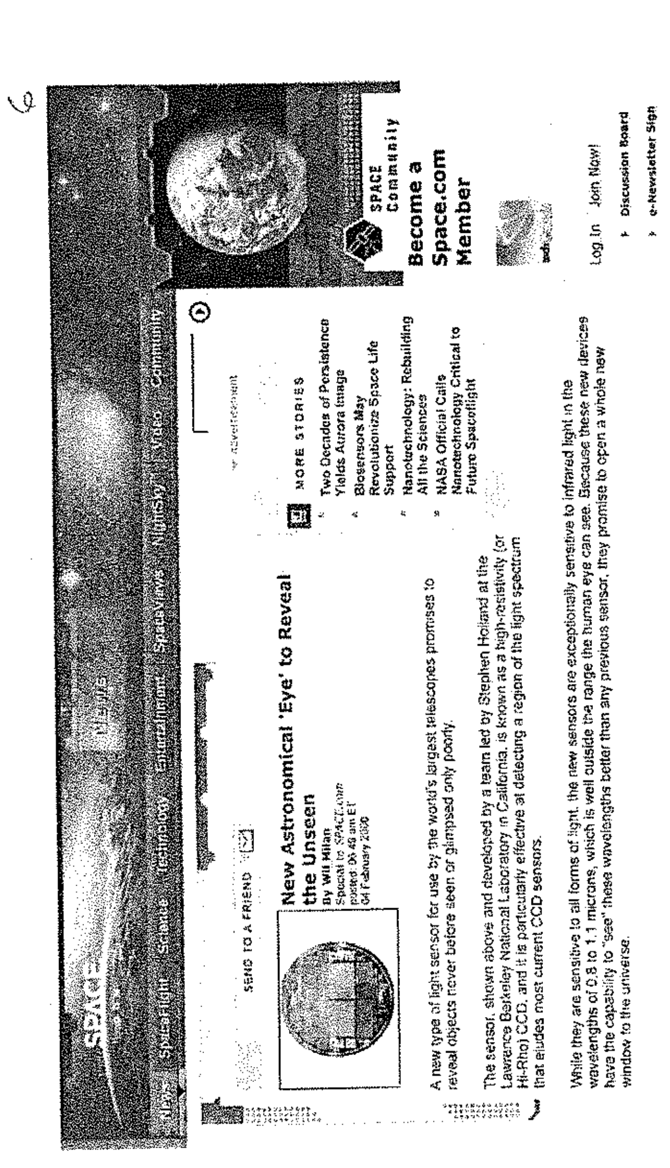






Hot Topics

Annex 6



SPACE.com — New Astronomical 'Eye' to Reveal the Unseen

Page 1 of 5

New Astronomical 'Eye' to Reveal the Unseen

By Wil Milan
Special to SPACE.com
posted: 06:49 am ET
04 February 2000

A new type of light sensor for use by the world's largest telescopes promises to reveal objects never before seen or glimpsed only poorly.

The sensor, shown above and developed by a team led by Stephen Holland at the Lawrence Berkeley National Laboratory in California, is known as a high-resistivity (or Hi-Rho) CCD, and it is particularly effective at detecting a region of the light spectrum that eludes most current CCD sensors.

While they are sensitive to all forms of light, the new sensors are exceptionally sensitive to infrared light in the wavelengths of 0.8 to 1.1 microns, which is well outside the range the human eye can see. Because these new devices have the capability to "see" these wavelengths better than any previous sensor, they promise to open a whole new window to the universe.

http://www.space.com/news/ccd_revolution_000203.html

26/05/31

Annex 6a

Arne Henden, senior research scientist at the U.S. Naval Observatory in Flagstaff, Arizona, said most of this range of light has been largely unexplored, even though it passes relatively well through the screen of our atmosphere.

What is a CCD?

A CCD (Charge-Coupled Device) is an electronic sensor that can detect and record patterns of light in a way similar to photographic film. But for astronomy, CCDs have several advantages over film. Want to know more?

"Very red objects such as brown dwarfs, or highly obscured objects such as extremely young stars (where longer wavelengths can pass through the dust), are more easily observed [with the new sensor]," Henden said. (Brown dwarfs are tiny stars that are thought to be quite common, but because they emit mostly infrared light they are very difficult to see with conventional sensors and cameras.)

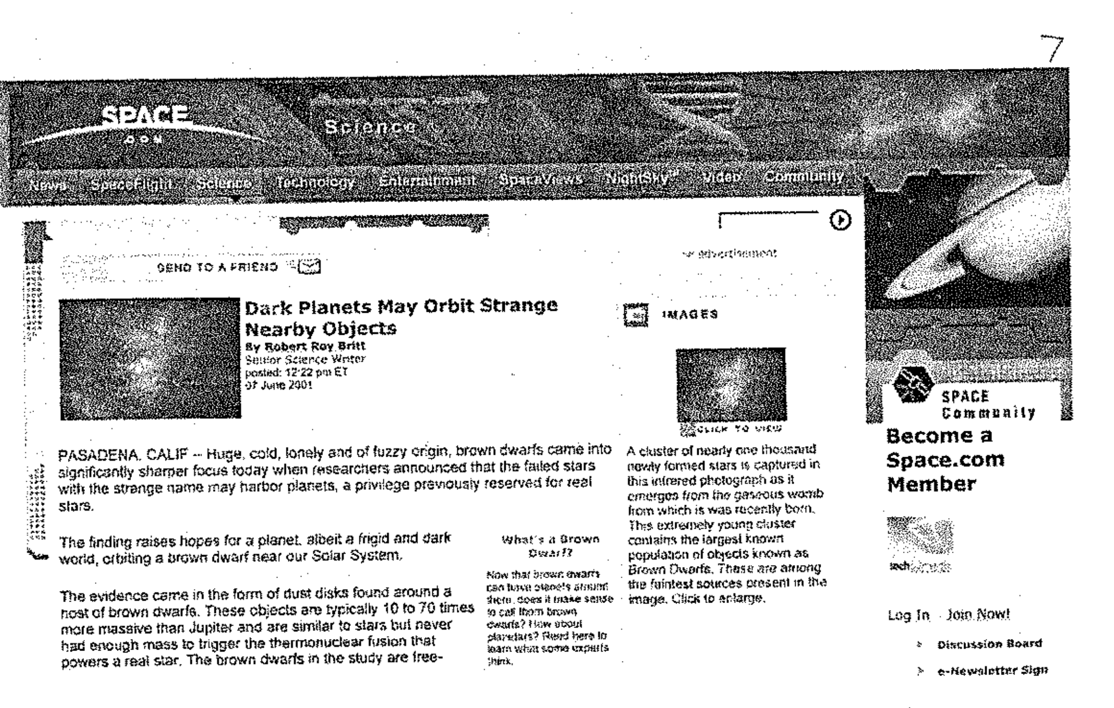
The new sensor also could help answer the deepest questions in cosmology, such as the shape and geometry of the universe. Don Groom, a collaborator in the development of the new sensor and member of the Supernova Cosmology Project, said the new device "enables effective observation of objects reddened by the cosmological redshift (these are objects at the remotest reaches of the universe) or by obscuring dust."

"For example," Groom said, "the reach of the Supernova Cosmology Project in discovering and observing very distant supernovae can now be very much extended, permitting sensitive measurements of the geometry of the universe and checks on our previous discoveries."

Because the new sensors are easier to make and can be joined side by side to make very large sensor arrays, astronomers will be able to equip their telescopes with the new sensors at a lower cost. That will increase the number of telescopes that can peer deeper into space.

The Hi-Rho CCDs may also find uses in other fields, such as medical imaging, possibly opening new venues in medical diagnosis and medical monitoring.

Annex 7



SPACE.com — Dark Planets May Orbit Strange Nearby Objects

Page 1 of 7

7

SEND TO A FRIEND

advertisement

Dark Planets May Orbit Strange Nearby Objects

By Robert Roy Britt
Senior Science Writer
posted: 12:22 pm ET
07 June 2001

PASADENA, CALIF -- Huge, cold, lonely and of fuzzy origin, brown dwarfs came into significantly sharper focus today when researchers announced that the failed stars with the strange name may harbor planets, a privilege previously reserved for real stars.

The finding raises hopes for a planet, albeit a frigid and dark world, orbiting a brown dwarf near our Solar System.

The evidence came in the form of dust disks found around a host of brown dwarfs. These objects are typically 10 to 70 times more massive than Jupiter and are similar to stars but never had enough mass to trigger the thermonuclear fusion that powers a real star. The brown dwarfs in the study are free-

What's a Brown Dwarf?

Now that brown dwarfs can have planets around them, does it make sense to call them brown dwarfs? How about planetars? Read here to learn what some experts think.

IMAGES

CLICK TO VIEW

A cluster of nearly one thousand newly formed stars is captured in this infrared photograph as it emerges from the gaseous womb from which is was recently born. This extremely young cluster contains the largest known population of objects known as Brown Dwarfs. These are among the faintest sources present in the image. Click to enlarge.

SPACE Community

Become a Space.com Member

Log In · Join Now!

- Discussion Board
- e-Newsletter Sign

http://www.space.com/scienceastronomy/astronomy/aas_browndwarfs_010607.html

26/05/31

Annex 7a

floating, meaning they do not orbit another star.

If brown dwarfs, even those on the low end of the range of mass for these objects, have planets around them, now there is no question that brown dwarfs form as stars do.

The debris disks strongly indicate that these free-floating brown dwarfs formed in the same way other stars form, in the gravitational collapse of a cloud of gas and dust. The findings were presented here Thursday at an American Astronomical Society meeting.

The new research also raises questions about the distinction between brown dwarfs and other free-floating interstellar objects that some researchers recently have identified and quibbled over. Those objects, less massive than most brown dwarfs, have been labeled planets by some astronomers.

Alien-free zone

A similar debris disk, called a circumstellar disk, developed around our own Sun shortly after its birth. From these disks, comets, asteroids and planets are made, and in at least one case even a habitable one, Earth. But don't expect to find any little green men on any potential planets around brown dwarfs.

"These would be very, very cold planets," said Charles J. Lada, an astrophysicist at the Smithsonian Astrophysical Observatory. "They're probably not really great places to have life."



In this artist conception, dust rings surround young brown dwarfs in the gaseous womb of M42 from which they were recently born. Credit: Harvard-Smithsonian Center for Astrophysics, Cambridge, Massachussetts. Artist: B. Scott Kahler



MORE STORIES

- Free-Floating Planets -- British Team Restakes Dubious Claim
- Search for Another Earth Quietly Underway
- Planet-Eating Stars Shape Solar Systems
- Asteroid Belt Like Ours Spotted Around Another Star

In fact, the forecast could call for temperatures as low as minus 423 degrees Fahrenheit, he said. Everything would be frozen solid.

Brown dwarfs emit very little energy, and a world in orbit around one would afford days no brighter than twilight. Any potential life would have to play by biological rules we don't currently know of.

The discovery, funded by the National Science Foundation, was made in a region of space called the Trapezium cluster, where a thousand very young stars huddle together some 1,200 light-years away in the Orion Nebula.

Using a European Southern Observatory (ESO) telescope in Chile, Lada and his colleagues looked at 100 objects that had previously been suspected of being brown dwarfs. More than half (63 percent) emitted extra infrared light, indicating a ring of hot, glowing debris.

Annex 7b

7

"The number of brown dwarfs that have disks is similar to the number of stars that have disks in Orion," Lada said in an interview.

After finishing their initial research, Lada and his colleagues also on a hunch searched through Hubble space telescope archives and found that other researchers had already spotted four of these disks in visible light but had not recognized them as circumstellar disks. These Hubble observations support the team's new conclusions.

Lada worked on the study with his sister Elizabeth A. Lada and August A. Muench, both of the University of Florida, and ESO astronomer Joao F. Alves, who cautioned that the presence of the dust disks does not guarantee existence of planets.

"It is entirely possible that the [Milky Way] Galaxy contains numerous planetary systems that orbit cold and dark, failed stars," said Alves. "Whether these disks can indeed form planetary systems, however, remains to be determined."

Fewer free-floating planets

The findings do mean that lone planets drifting freely through space might be less common than thought.

Several dozen extrasolar planets, most of them many times more massive than Jupiter, have been discovered over the past six years. They all orbit stars. Over the same time frame, brown dwarfs, usually existing by themselves in interstellar space, have been found to be rather common.

But more recently, researchers have spotted very faint objects floating freely in space that are smaller than most brown dwarfs, roughly 10 times as massive as Jupiter, and some have called them planets. Others have contested this speculation, saying an object must orbit a star to be called a planet.

Brown dwarfs, ill-defined, have been caught in the middle of this confusion.

Lada said his group's findings do not rule out the possibility of free-floating planets, but they put an upper limit on the mass of such objects. Any free-floating object above 20 Jupiter masses will almost certainly be a brown dwarf, Lada said, adding that the rule might apply to objects as low as 10 Jupiter masses.

Previous estimates had but the range as high as 70 Jupiter masses.

As for nearby brown dwarfs, the closest free-floating brown dwarfs discovered so far (in a separate study) is about 13 light years from Earth, and researchers expect to find much closer brown dwarfs in the future, possibly within one light year of our Solar System.

Annex 7c

If brown dwarfs do in fact exist so near our Solar System, it stands to reason that they might also harbor planets.

For now, the closest candidate object for harboring planets was Alpha Centauri, which is 4.3 light years away. The brown dwarf finding offers a mechanism for generating a planet just outside our Solar System.

Gravitational billiards

Objects below 10 Jupiter masses might be planets, given the new findings. But Lada said any such planets probably would have formed in a conventional manner, around a star, to be later ejected into interstellar space by the gravitational tug of a passing star or some other means.

Such objects even could have been ejected by our Solar System, he said.

Further, the study found that in the Trapezium Cluster, which contains by far the largest number of known brown dwarfs, the bulk of those examined are of the larger variety. Proportionally, very few smallish brown dwarfs exist.

"This narrows the range of possibilities" for free-floating planets, Lada said, and will make the search "much more difficult, because if they are there they will be rare and difficult to detect," owing to their low mass and extremely low energy output.

Geoffrey Marcy, a renowned hunter of extrasolar planets from the University of California, Berkeley, was not involved in the research but called the evidence compelling. He is convinced that the excess infrared light from brown dwarfs measured in the study is in fact due to circumstellar disks.

Marcy said the new study does not change the view of extrasolar planets orbiting stars. All of them have masses of less than 13 Jupiters. Further study could find that some are slightly larger, he said.

"The bulk of the 67 extrasolar planets found so far have masses of less than three or four Jupiter masses," Marcy told SPACE.com.

Marcy, who with his colleagues has found more extrasolar planets than anyone, said detecting planets around a brown dwarf, even one that's a light year away, would be "an enormous challenge."

Click here for more news and information about extrasolar planets.

Space Video Collection

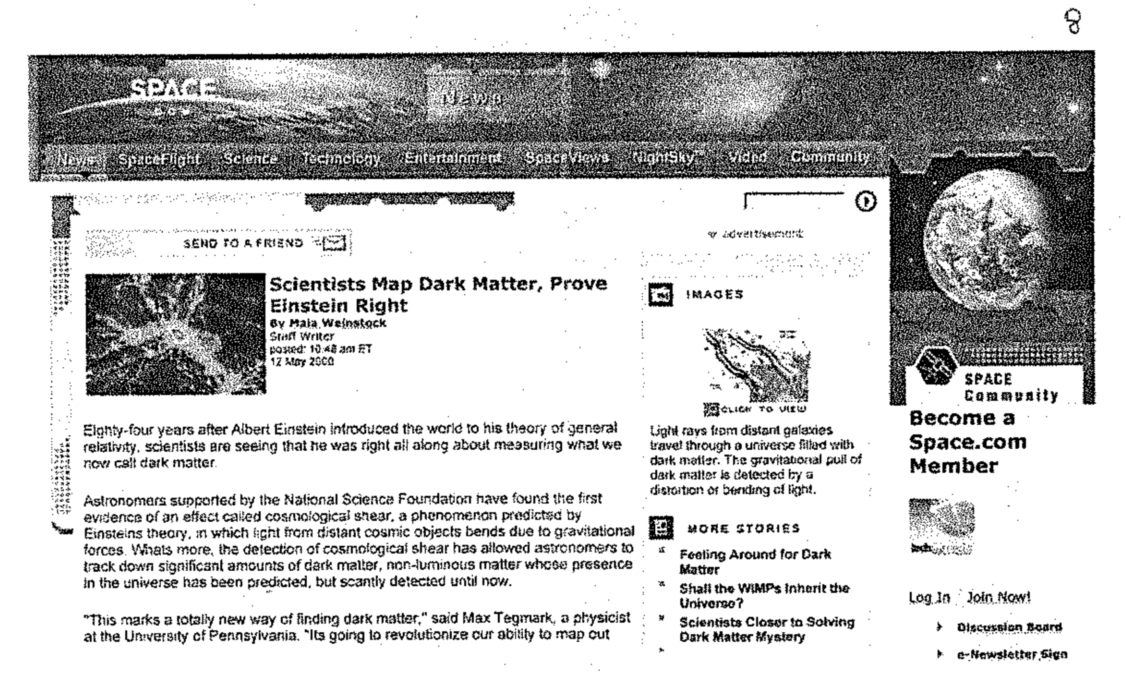
Space Image Gallery Collection

Annex 8

SPACE.com -- Scientists Map Dark Matter, Prove Einstein Right

Page 1 of 5

8



News SpaceFlight Science Technology Entertainment SpaceViews NightSky Video Community

SEND TO A FRIEND

Scientists Map Dark Matter, Prove Einstein Right

By Maia Weinstock
Staff Writer
posted: 10:48 am ET
12 May 2000

Eighty-four years after Albert Einstein introduced the world to his theory of general relativity, scientists are seeing that he was right all along about measuring what we now call dark matter.

Astronomers supported by the National Science Foundation have found the first evidence of an effect called cosmological shear, a phenomenon predicted by Einsteins theory, in which light from distant cosmic objects bends due to gravitational forces. Whats more, the detection of cosmological shear has allowed astronomers to track down significant amounts of dark matter, non-luminous matter whose presence in the universe has been predicted, but scantly detected until now.

"This marks a totally new way of finding dark matter," said Max Tegmark, a physicist at the University of Pennsylvania. "Its going to revolutionize our ability to map out

advertisement

IMAGES

CLICK TO VIEW

Light rays from distant galaxies travel through a universe filled with dark matter. The gravitational pull of dark matter is detected by a distortion or bending of light.

MORE STORIES

- Feeling Around for Dark Matter
- Shall the WIMPs Inherit the Universe?
- Scientists Closer to Solving Dark Matter Mystery

SPACE Community

Become a Space.com Member

Log In Join Now!

- Discussion Board
- e-Newsletter Sign

http://www.space.com/news/cosmic_shear_000512.html

26/05/31

Annex 8a

where all the dark matter is."

The results on cosmological shear were published in this week's issue of the journal Nature.

BESS Scans Heavens for Antimatter

Observable matter takes up no more than about 10 percent of the total amount of matter predicted to exist in the universe. The rest dubbed dark matter because it cant be "seen" or detected in the same way that gas, dust, and other observable matter can remains largely a mystery to astronomers precisely because its so difficult to find. Now, researchers have a new tool for uncovering the elusive stuff.

On the left is an optical image of a small cluster of galaxies. The center image shows a 1-degree image of the same field. The right image represents a mass map of the same patch of sky.

"The existence of dark matter has been known for a long time, and has even been mapped in various places over the past decade," explained astrophysicist David Wittman of Bell Labs, Lucent Technologies. "But the places that had been mapped were small areas of the sky. Whats new here is that we have studied a fair sample of the universe and so were able to deduce some properties of the universe in general."

Cosmological shear helps astronomers "see" dark matter because it makes the light from distant galaxies appear distorted. A distant spherical-shaped galaxy, for example, will appear elliptical to astronomers back on Earth. This is because dark matter existing in the path between the galaxy and Earth exerts a gravitational pull on the light, causing it to bend.

Wittman and a team of researchers analyzed 145,000 distant galaxies in order to find evidence of cosmological shear, also known as "weak gravitational lensing." They used a special camera called a charged couple device or CCD and the 4-meter Blanco telescope at the Cerro Tololo Interamerican Observatory in Chile.

The recent observations have also shed new light on the eventual fate of the universe. Astrophysicists currently predict that the total amount of matter present in the universe will determine whether the universe will continue to expand, or whether it will eventually slow down, or even begin to contract. According to Wittman, the scientists observations of cosmological shear have suggested that the overall density of matter in the universe is "too low to stop the expansion of the universe."

Annex 8b

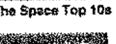
At the same time, astronomers admit that their new method for finding dark matter has not yet been tested enough to allow experts to make a definitive generalization about the fate of the universe. "Since our approach is new, its not very precise yet," said Wittman. "Really strict tests of the theory will come in the next few years as astronomers measure the [weak] lensing more and more accurately."

"Ultimately, wed like to be able to map the whole sky to see just how much dark matter is out there," added Tegmark. For now, the use of cosmological shear to uncover dark matter in one region of the universe at a time will have to suffice. But as Bell Labs astrophysicist Anthony Tyson joked, "The future looks bright for dark matter."

8




The Space Top 10s




Vote for your Space Favorites



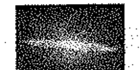

Space Trivia



Multimedia Features




SPACE.com Reader Favorites



Space Wallpapers

Annex 9

9

European
Southern
Observatory

Press Releases

ESO for the Public > Press Releases

07 May 2010

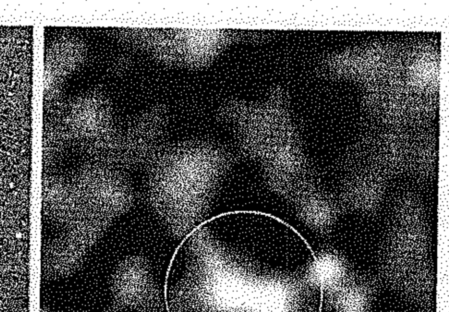
eso0040 - Science Release

BOOKMARK

The VLT Weighs the Invisible Matter in the Universe

Shapes and Orientations of 76,000 Distant Galaxies

1 December 2000



Click to Enlarge

An international team of astronomers [1] has succeeded in mapping the "dark" (invisible) matter in the Universe, as seen in 50 different directions from the Earth. They find that, within the uncertainty, it is unlikely that mass alone would stop the current expansion of the Universe. This fundamental result

Annex 9a

is based on the powerful, but challenging method of "cosmic shear". It depends on very accurate measurements of the apparent, weak distortion and preferential orientation of images of distant galaxies. This effect is caused by deflection of the light from those galaxies by the large mass concentrations in the Universe it encounters on its way to us. The larger these masses are, the larger are the apparent image distortions and the more pronounced are the alignments of neigbouring galaxy images. The new analysis was made possible by means of unique observational data, obtained under excellent conditions with the the ESO 8.2-m VLT ANTU telescope and the multi-mode FORS1 instrument at the Paranal Observatory.

The VLT Observations

An international team lead by astronomers at the Institut d'Astrophysique de Paris [1] used for the first time the VLT to probe the mass density of dark matter in the Universe, by means of weak gravitational lensing effects.

The team selected 50 different sky fields which were then observed in service mode by the ESO staff at the Paranal Observatory. Long exposures of these fields were made with the FORS1 instrument (in its imaging mode) on the VLT 8.2-m ANTU telescope and only during nights with the very best observing conditions. In fact, 90% of the fields have image quality better than 0.65 arcsec, guaranteeing a superb basis for the subsequent study.

Clumps of dark matter

The unprecedented quality of these data enabled the astronomers to measure the shapes and orientations of the images of more than 70,000 galaxies with very high precision. After a careful statistical analysis, they were able to demonstrate that the distant galaxies are not randomly oriented on the sky - they show a a certain degree of alignment over substantial sky areas (to distances of several arcmin)

The astronomers refer to this as a coherent orientation. It can only be explained by gravitational lensing effects produced by clumps of dark matter in space, distributed along huge "filaments". ESO Press Photo eso0040 demonstrates this, by means of the VLT exposure (right) and the deduced mass distribution in the same direction, based on these measurements.

The weak lensing effect

The gravitational lensing effect was predicted by Einstein's theory of general relativity at the beginning of the century.

When the light of a distant galaxy passes close to a concentration of matter in space, it will be (more or less) deflected, due to the effect of the field of gravity of this matter. The observed image of the galaxy is therefore distorted.

Very strong gravitational lensing effects (by very heavy objects) produce spectacular gravitational arcs observed in some rare clusters of galaxies, cf. the VLT images of CL2244-0 and Abell 370.

Much weaker lensing effects (by less massive objects) are in fact present everywhere in the Universe, but they are not easy to detect. This was the effect the astronomers searched for. It manifests itself as a small stretching in a particular direction of the images of all galaxies that are located behind the gravitational lens. This phenomenon may then be observed as an alignment of galaxies in that particular sky area. The existence of the lens and its overall mass and extension can then be determined, albeit with some uncertainty only.

Annex 9b

9

An important contribution to the map of the Universe

Thanks to the large light collecting power of the VLT and the superb quality of the present images, the team succeeded in detecting large-scale, weak lensing effects in the Universe, in a large number of different (and thus independent) directions. Moreover, the analysis of this large data sample enabled the astronomers, for the first time, to set limits to the overall mass density of the universe, by means of the gravitational lensing by large scale structures. It turns out that their results are in remarkable agreement with the current constraints obtained by other cosmological considerations.

This kind of investigation is rather difficult and cannot be based on individual sky fields alone. The final result, in terms of the inferred mass density of the Universe, only emerges when "adding" all of the 50 observed fields.

Making the reasonable assumption that the distribution of galaxies and dark matter in space is similar, the new investigation shows that the total matter density is less than half of what is needed to stop the current cosmic expansion. The new result also supports the existence of a non-zero "cosmological constant" (vacuum energy), already indicated by supernova observations, cf. eso9821.

In the ongoing quest for establishing the first true mass map of the Universe from the gravitational lensing effects caused by this mass, the VLT has now demonstrated its great potential with bravour.

The light collecting power and, not least, its excellent image quality provides what is likely to be the best observing configuration for this very challenging research programme. It was also made possible because of the opportunity to use the VLT Service Mode during which ESO staff astronomers at Paranal are responsible for carrying out the actual observations, at the moment of the very best atmospheric conditions.

Notes

[1]: The team consists of Yannick Mellier (Principal Investigator [PI]; Institut d'Astrophysique de Paris [IAP] and Observatoire de Paris/DEMIRM [OP-DEMIRM], France), Ludovic van Waerbeke (co-PI, IAP), Roberto Maoli (IAP, OP-DEMIRM and University La Sapienza, Rome, Italy), Peter Schneider (University of Bonn, Germany), Bhuvnesh Jain (John Hopkins University, Baltimore, USA), Francis Bernardeau (Service de Physique Theorique, C.E. de Saclay, France), Thomas Erben (Max Planck für Astrophysik, Garching, Germany, IAP and OP-DEMIRM) and Bernard Fort (IAP).

More information

The research described in this Press Release is reported in a research article ("Cosmic Shear Analysis in 50 Uncorrelated VLT Fields. Implications for Omega-0 and sigma-8."), submitted by the team to the European journal "Astronomy and Astrophysics". Note also the related article in the ESO Messenger (No. 101, p. 10-14, September 2000).

Contacts

Yannick Mellier
Institut d'Astrophysique de Paris
Paris, France

Annex 10

Dark Matter Exposed: Animation Offers Clues to Cosmic Mystery

SCIENCE TUESDAY

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
15 April 2003

PHILADELPHIA - As if it weren't strange enough that the cosmos is loaded with invisible and elusive matter, a new theory has the stuff wandering through the early universe like a drunken sailor.

The idea is a serious attempt to examine dark matter -- which is far more prevalent than normal matter -- by modeling its behavior, despite the troubling fact that no one knows what it actually is. The result is an animation showing how thousands of relatively small and invisible dark matter galaxies might have developed and still reside in the vicinity of our own Milky Way.

Chung-Pei Ma, an astronomer at the University of California, Berkeley, unveiled the new theory here last week at a meeting of the American Physical Society. Ma envisions dark matter particles behaving like bits of dust bounced around by water molecules in a microscopic process called Brownian motion.

Annex 10a

10

Brownian motion was discovered in 1827 by botanist Robert Brown, who noticed a pollen grain moving erratically for unseen reasons under his microscope. Einstein later figured out that molecules were bouncing randomly off the pollen. The concept was applied decades ago to better understand the behavior of stars in dense clusters.

Ma describes Brownian motion as being something like the unpredictable path of a drunken sailor. She and her colleague, Ed Bertschinger of MIT, were surprised that the basic principle of Brownian motion could be applied on a galactic scale, but the results fit a line of theoretical thinking that predicts dark satellite galaxies should exist.

SCIENCE TUESDAY

Visit SPACE.com to explore a new science feature each Tuesday.

>>Go to Science Tuesday archive page

Modeling the invisible

Scientist suspect the bulk of dark matter involves tiny particles they've yet to detect. The two leading candidates are called axions and neutralinos. Whatever they are, they are known to interact gravitationally with regular matter, because observable matter can't account for the speed with which stars move around galactic centers.

Images

CLICK TO VIEW

Stills from the animation: Simulated particles of dark matter wander like drunken sailors but finally come together in these five panels. However, in addition to a primary galaxy, several significant satellite knots of dark matter result.

Dark matter particles appear not to interact with electromagnetic forces, however. They don't make or reflect light, which explains why they can't be seen.

"It has to be some kind of exotic particle, something we can't touch," Ma said.

Until recently, scientists assumed dark matter was distributed evenly in a massive halo around each galaxy. Not quite true, Ma and others have come to believe. The halos are there, but so possibly are thousands of clumps that can be thought of as dark, satellite galaxies, several researchers have suggested in recent years. One idea for along these lines was put forth in 2001 by a team led by Neil Trentham at the University of Cambridge. Trentham said that for every normal, star-filled galaxy, there might be 100 that contain primarily stuff we can't see.

Related SPACE.com STORIES

- 'Groundbreaking' Discovery: First Direct Observation of Dark Matter
- Missing Matter Found, Partially Squaring Cosmic Accounting Sheets
- Scientists Doubt Claims of Invisible 'Mirror' Comets and Asteroids

Dark matter satellite galaxies -- if they exist -- cannot be detected by conventional telescopes because they don't contain enough normal matter to fuel star birth.

TODAY'S DISCUSSION

Ma and Bertschinger let millions of hypothetical dark matter particles interact over billions of years in a computer model governed by gravity. Many of the

Annex 10b

10

particles coalesce into central clumps as massive as billions of suns, a neat fit with expectations for the process that would build a normal galaxy.

What do you think of this story?

>>Uplink your views

But thousands of dark galaxies develop in the simulation, too, each containing masses equal to several million suns.

"We then realized that the motion of dark matter can also be described statistically by a similar equation used for the Brownian motion," Ma told *SPACE.com*. "This equation is very different from Newton's law [of gravity] used in the computer model. This doesn't mean Newton's law is not applicable -- it means the new equation that we found provides a new language for describing how dark matter clumps."

A paper describing the new work will soon be submitted to the *Astrophysical Journal* for possible publication.

The Simulation

CLICK TO SEE FULL ANIMATION

Gravity pulls dark matter into clumps, but Brownian motion aptly describes the "drunken sailor" behavior of the particles.
IMAGE: Chung-Pei Ma, University of California, Berkeley

Finding dark matter

Dark matter makes up about 23 percent of the universe's mass-energy budget. Normal matter, the stuff of stars, planets and people, contributes just 4 percent. (The rest of the universe is driven by an even more mysterious thing called dark energy.)

A small portion of dark matter has already been identified and is no longer mysterious. Tiny particles called neutrinos, once thought to be massless, are now known to make up a sprinkling of the total dark matter column of the budget. Cold dead stars, recently found to be plentiful, also contribute modestly to this accounting.

If dark satellite galaxies exist, astronomers should be able to detect some of them. Their gravity would bend light traveling toward Earth from more distant objects, distorting and possibly magnifying them. This so-called gravitational lensing effect is used already to study distant objects by peering through and around visible, intervening galaxies or galaxy clusters.

Finding and cataloguing these dark matter galaxies would help researchers understand what they're made of.

"Different dark matter models [for material that is cold or warm] predict different number of these dark galaxies," Ma said. "So if we can estimate the number and masses of these galaxies, it can constrain the nature of dark matter."

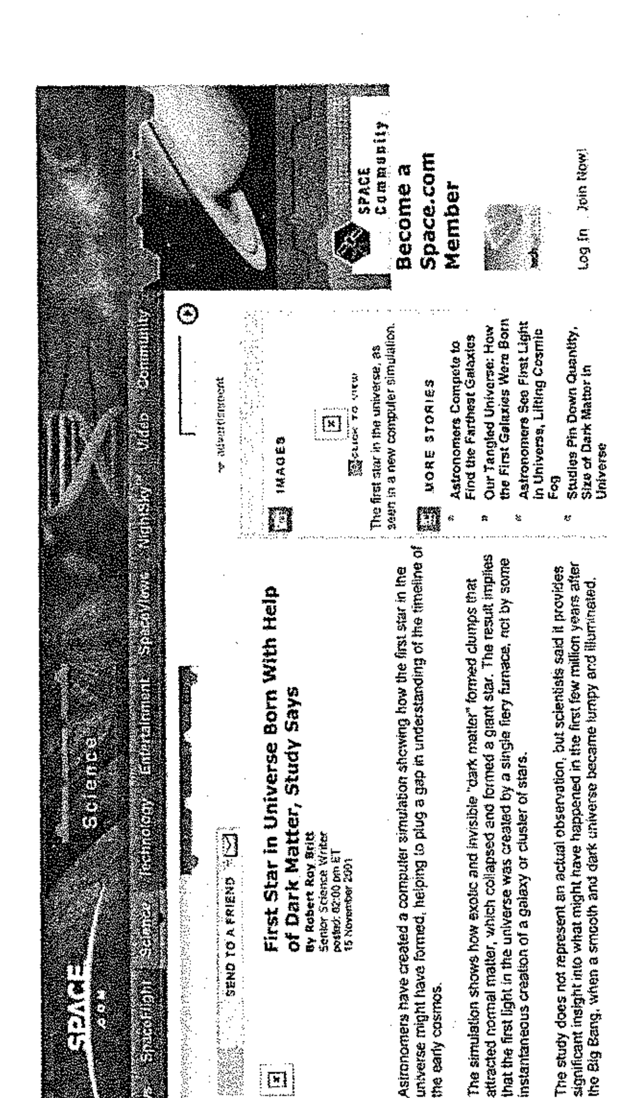
Annex 10c

Saul Perlmutter of the Lawrence Berkeley National Laboratory, speaking at the same meeting of physicists, said knowledge of dark matter has come a long way since the first strong hints of it emerged in the 1970s. Researchers no longer wrestle with whether it exists or how much there is but instead can focus on its properties, Perlmutter said.

He added, though, that physicists should remain humble about the time it might take to figure out the remaining mysteries.

- **About Dark Matter**
- **The Search for Dark Energy**
- **More Cosmology News**
- **Space Photo Galleries & Wallpaper**
- **Astronotes**

Annex 11


SPACE.com — First Star in Universe Born With Help of Dark Matter, Study Says

Page 1 of 7

News SpaceFlight Science Technology Entertainment SpaceViews NightSky Video Community

SEND TO A FRIEND

First Star in Universe Born With Help of Dark Matter, Study Says

By Robert Roy Britt
Senior Science Writer
posted: 02:00 pm ET
15 November 2001

Astronomers have created a computer simulation showing how the first star in the universe might have formed, helping to plug a gap in understanding of the timeline of the early cosmos.

The simulation shows how exotic and invisible "dark matter" formed clumps that attracted normal matter, which collapsed and formed a giant star. The result implies that the first light in the universe was created by a single fiery furnace, not by some instantaneous creation of a galaxy or cluster of stars.

The study does not represent an actual observation, but scientists said it provides significant insight into what might have happened in the first few million years after the Big Bang, when a smooth and dark universe became lumpy and illuminated.

IMAGES

CLICK TO VIEW

The first star in the universe, as seen in a new computer simulation.

MORE STORIES

- Astronomers Compete to Find the Farthest Galaxies
- Our Tangled Universe: How the First Galaxies Were Born
- Astronomers See First Light in Universe, Lifting Cosmic Fog
- Studies Pin Down Quantity, Size of Dark Matter in Universe

SPACE Community

Become a Space.com Member

Log In Join Now!

http://www.space.com/scienceastronomy/first_star_011115.html

23/12/30

Annex 11a

The research team, led by Tom Abel at the Harvard Smithsonian Center for Astrophysics, says a lone object developed out of a cloud of raw material, a first star that became one of many seeds that later formed the first galaxies.

The first star, along with others that presumably formed soon after in a similar manner, died quickly and cannot be seen or studied today. So astronomers have long wondered how such objects formed.

"Significant progress is being made in this area and we are very close to finding a solution to how the first stars formed," said Morris Aizenman, senior science associate in the Mathematical and Physical Science Directorate of the National Science Foundation.

"Abel's study is a significant step forward," said Aizenman, who was not involved in the work but has examined the methods and results.

A paper describing the simulation was published Thursday in *Science Express*, an online sister publication to the journal *Science*. Greg Bryan at the Massachusetts Institute of Technology and Michael Norman of the University of California-San Diego developed the sophisticated computer code used by the team and also worked on the research.

A simple palette

Most stars today are rich in metals. But the early universe was metal-free.

Astronomers have long assumed that the first stars must have been an as-yet-unknown metal-free variety, and that they exploded soon after they were born, forging metal and flinging it into space. Later, the more diverse array of material would have been gathered up to make second- and third-generation stars.

Since it is not yet possible to see these earliest stars, researchers employ computers to model what might have happened.

The task is complex, but the range of possibilities is simpler than one might think, because there was little to work with in the infant universe. Most of the material and processes that makes modeling today's universe incredibly complex simply didn't exist back then.

There were no magnetic fields. No space dust. No cosmic rays. And only a handful of chemical elements existed.

After the Big Bang, estimated to be between 12 and 15 billion years ago, the universe was composed mostly of dark matter, invisible particles that are widely accepted to exist but have not yet been detected. A relatively smooth distribution of dark matter and some normal matter, mostly hydrogen atoms, permeated the young cosmos, theorists say.





Annex 11b

But lumps and bumps developed, catalysts that were destined to form something.

The first star

Abel explained for *SPACE.com* how the new simulation shows the first star developing, and what his group's findings mean for theorists.

The process began just 13 million years after the Big Bang. Small perturbations had formed in the fabric of the universe. After 100 million years, dark matter is attracted to these "density fluctuations," as researchers call them. Over time, several draw together to form one larger clump.

Atoms of hydrogen are pulled in, too. The hydrogen is compressed and heats up, much like the air in a tire warms as you pump more air into it. Some hydrogen atoms, now pressed more tightly together, combine to form molecules -- molecular hydrogen.

The result is the development of a molecular cloud, something seen in our own galaxy today and known to be a precursor to star formation.

After 155 million years -- an eyeblink in cosmological terms -- a cloud of normal and dark matter has built up the mass of a million suns. In the center, a star about the mass of our Sun is born. The very first star in the universe.

Overindulgence

Nearby, however, at the center of the cloud and surrounding the new star, there is enough gas to make 200 more suns. The first star uses its newfound gravity to reel this gas in. The final mass of the first star is not determined by Abel's simulation, but it is thought to grow to gargantuan proportions.

There is a limit, however.

Scientists are convinced that a star more than 100 times as massive as the Sun is forced to explode in what's known as a supernova.

Given the material available to the first stars in the new model, they would likely have grown quickly and become so massive as to explode after just a few million years.

Abel said one of the most significant aspects of the simulation is that the collapse of material in the cloud happens so rapidly that it forms just one star, instead of being fragmented into several. And the first star would have cannibalized any effort to generate another nearby star.



The Space Top 10s



Vote for your Space Favorites



Space Trivia



Multimedia Features

SPACE.com Reader Favorites

Space Wallpapers

Annex 11c

"The star is so luminous in ultraviolet photons that it destroys all the hydrogen molecules that would be needed to form other stars nearby," he explained.

Over the past three decades, other theorists have suggested that the first objects to form in the universe might have been black holes or possibly clusters of stars. The new view, if it stands up, implies that "most of the speculations of the last decades, which assumed the cloud would fragment, are incorrect," Abel said.

Long gone

There is no chance of seeing one of these first stars in our galaxy.

"Since all these stars formed billions of years ago, they have already exploded by now," Abel said. "However, one is hoping to see signatures of these first objects in the images of distant galaxies. They are billions of light years away and hence the most distant of these galaxies perhaps still host some of the first stars."

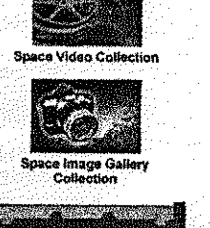
So far, researchers have not spotted the most distant galaxies thought to have existed, but many believe they are on the threshold of doing so.

The simulation was done on the SGI Origin2000 supercomputer at the National Center for Supercomputing Applications at the University of Illinois. Abel said it is the first such set of calculations to simultaneously follow the collapse of material from cosmological scales down to stellar scales.

"The most amazing thing for us is that we can realistically recreate the events that made the first objects in the universe," Abel said.

More About Deep Space & Cosmology: Astronomy News by Topic

This Week in Science & Astronomy: News Briefs

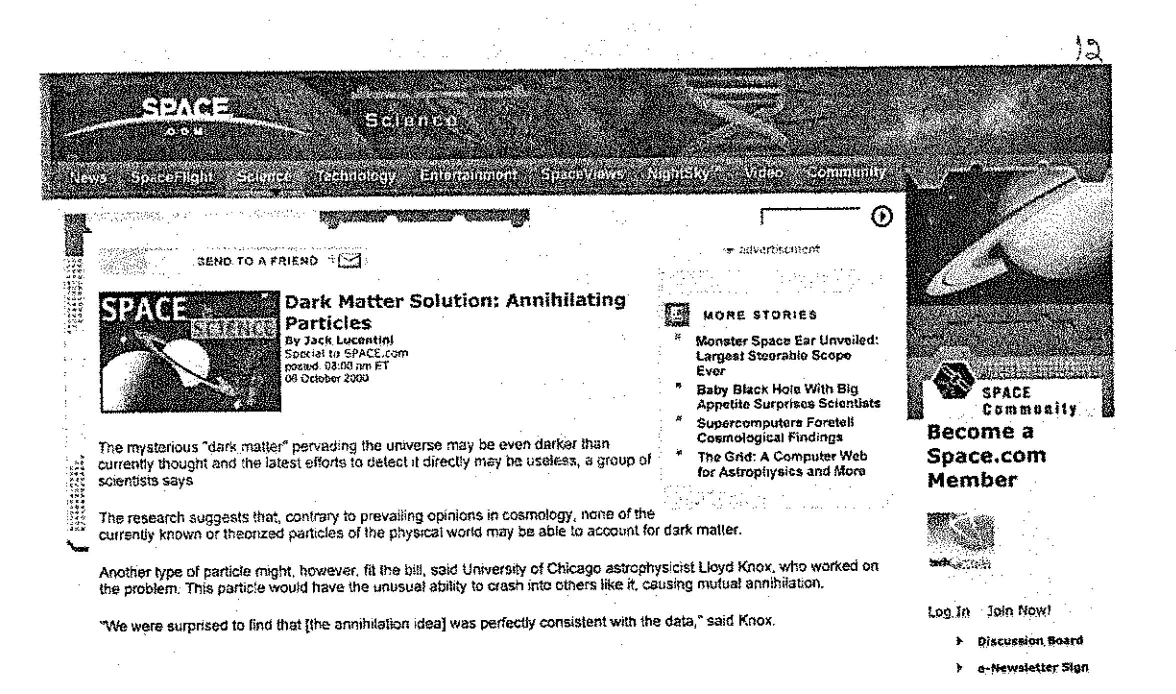


Space Video Collection



Space Image Gallery Collection

Annex 12



Dark Matter Solution: Annihilating Particles

By Jack Lucentini
Special to SPACE.com
posted: 08:00 am ET
08 October 2000

The mysterious "dark matter" pervading the universe may be even darker than currently thought and the latest efforts to detect it directly may be useless, a group of scientists says

The research suggests that, contrary to prevailing opinions in cosmology, none of the currently known or theorized particles of the physical world may be able to account for dark matter.

Another type of particle might, however, fit the bill, said University of Chicago astrophysicist Lloyd Knox, who worked on the problem. This particle would have the unusual ability to crash into others like it, causing mutual annihilation.

"We were surprised to find that [the annihilation idea] was perfectly consistent with the data," said Knox.

MORE STORIES
- Monster Space Ear Unveiled: Largest Steerable Scope Ever
- Baby Black Hole With Big Appetite Surprises Scientists
- Supercomputers Foretell Cosmological Findings
- The Grid: A Computer Web for Astrophysics and More

Annex 12a





This image shows a simulation of the distribution of dark matter in a large volume of the universe. The box shown spans a distance of about [illegible] billion light-years. The structures are displayed so that the brighter regions have a higher density (that is, more dark matter) than the darker regions. The dark matter is concentrated into a web-like distribution of filaments that intersect at dense nodes where great clusters of galaxies are expected to form and become visible. At the rear of the cube (to the left), three blue dots represent three distant galaxies. The yellow lines that cross the box represent light rays from those galaxies propagating through the universe. In the absence of intervening matter, the light would travel on straight lines but in the presence of matter, the paths of the rays are evidently deflected by the gravitational effects of the clumpy matter (the breaks in the yellow lines illustrate the light passing behind a clump of dark matter).

According to the proposal, galactic centers are hotbeds of annihilating dark matter.

Knox described the idea as tentative, but if correct, he said, it could overthrow leading theories of physics, which depend on other types of particles serving as dark matter.

The approach could force scientists to develop a "new physics," Knox said. His research, done in cooperation with researchers at the University of Chicago and the Fermi National Accelerator Laboratory, is set for publication in the journal *Physical Review Letters* and was written in response to a puzzle that has stymied astrophysicists.

Scientists are certain that the universe is made up mostly of a mysterious, undetected substance. The way that galaxies rotate and move around each other gravitationally indicates there is much more mass than what is seen and currently identified as stars, galaxies, nebulae and dust clouds. By studying these motions, astronomers have inferred the quantity and distribution of dark matter. The obscure material is thought to float around in large blobs called halos, each of which is centered on a galaxy.

The trouble is that when scientists run computer simulations of how the hypothesized dark matter might behave, a sharp concentration, or "cusp," of the stuff always winds up near the galaxy center. But scientists can detect no such

Annex 12b

concentrations in the real sky using current methods, such as measuring galaxy rotation rates and studying how the gravity of dark matter might bend light from distant galaxies.

The explanation, the researchers think, might be that the dark matter destroys itself in annihilation interactions when it becomes too dense.

Matter with this property could be structured so as to exactly cancel out the anomalous "density cusps" in the simulations, he said. The simulations falsely assume that dark matter is "collisionless" and "non-interacting," that is, its particles do not slam into or influence each other, Knox says.

The research is still tentative because the "cusp" problem may not be a problem at all, Knox said. With constantly improving observations, he explained, astronomers may actually find the cusps that the computers insist are there.

However, if this latest research is correct, it would overturn a popular advance in physics, called string theory, which treats elementary particles as extended one-dimensional thread-like objects.

String theory puts forth its own candidates for dark matter -- particles such as axions, that have one-trillionth the mass of tiny electrons, and neutralinos, which are heavier than the protons that make up atoms. None of these bits of matter have the requisite self-annihilation properties, Knox said.

As a result, large laboratories currently trying to find the stuff could become useless, because the dark matter might have no effect on their detectors, and scientists would have to start seeking a particle outside their current models.

Future galaxy observations will demonstrate whether this view is correct by verifying whether the density concentrations exist, Knox said.

"We still don't have a smoking gun that there is a problem," he said. "Galaxy observations are going to improve. If they continue to indicate a problem with totally non-interacting, collisionless dark matter...then it will be very exciting indeed."

Knox's team wasn't the first to consider the possibility that dark matter might self-annihilate.

However, he said, other astronomers had rejected the idea because it appeared that such annihilation events would have wiped out all the dark matter a long time ago.

Knox's team described several scenarios under which that would not have happened. For instance, dark matter particles may arise from the decay of other types of matter. These decays could have happened after the danger of mass annihilations in the very compact, early universe passed.

12



The Space Top 10s



Vote for your Space Favorites



Space Trivia



Multimedia Features



SPACE.com Reader Favorites

Space Wallpapers

Annex 12c

The authors acknowledged that their scenario rests on assumptions that may or may not be right. Those requirements, they wrote, "are stringent, but by no means impossible."

Physicists are about to start closing in on what the dark matter is, and this latest research may be a key first step, said UC Davis physicist Andreas Albrecht.

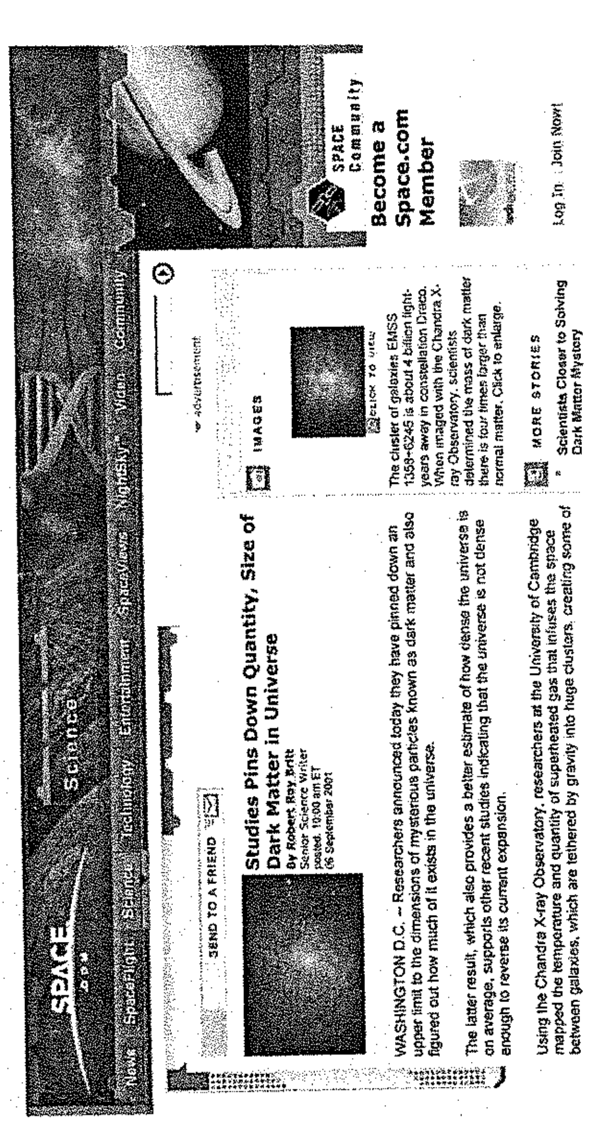
"We're entering a phase where we have to know exactly what the dark matter is like," Albrecht said, "and we'll be able to tell which ideas are right or wrong, at a much higher level of precision than we've had so far. This is the age of precision in cosmology."

Space Video Collection

Space Image Gallery Collection

12

Annex 13



SPACE.com -- Studies Pins Down Quantity, Size of Dark Matter in Universe

Page 1 of 7

SEND TO A FRIEND

Studies Pins Down Quantity, Size of Dark Matter in Universe

By Robert Roy Britt
Senior Science Writer
posted: 10:00 am ET
06 September 2001

WASHINGTON D.C. -- Researchers announced today they have pinned down an upper limit to the dimensions of mysterious particles known as dark matter and also figured out how much of it exists in the universe.

The latter result, which also provides a better estimate of how dense the universe is on average, supports other recent studies indicating that the universe is not dense enough to reverse its current expansion.

Using the Chandra X-ray Observatory, researchers at the University of Cambridge mapped the temperature and quantity of superheated gas that infuses the space between galaxies, which are tethered by gravity into huge clusters, creating some of

advertisement

IMAGES

CLICK TO VIEW

The cluster of galaxies EMSS 1358+6245 is about 4 billion light-years away in constellation Draco. When imaged with the Chandra X-ray Observatory, scientists determined the mass of dark matter there is four times larger than normal matter. Click to enlarge.

MORE STORIES

- Scientists Closer to Solving Dark Matter Mystery

SPACE Community

Become a Space.com Member

Log In : Join Now!

.../dark_matter_010906.html

25/12/

Annex 13a

13

the largest structures in space.

The hot gas is only visible in X-rays. In years past, it had gone unseen because X-rays do not penetrate Earth's atmosphere. But now space-based observatories like Chandra can detect it.

The Cambridge researchers examined five galaxy clusters, all between 1.4 billion and 4 billion light-years away, and added the mass of all the gas they found to the known mass of stars. They compared their result to the amount of mass that should be in the clusters to keep them from flying apart, a figure known from previous studies.

"We found that the stars in the galaxies and the hot gas together contribute only about 13 percent of the mass," said Steven Allen, a Cambridge researcher who led the study. "The rest must be in the form of dark matter."

The results were presented here at a Chandra Observatory symposium.

Because large galaxy clusters are thought to contain a significant proportion of the mass of the universe, the new study gives a better picture of how much dark matter likely exists. Previously, researchers had estimated that between 80 and 95 percent of the mass of the universe was missing and must be dark.

The new study "really settles the question" by providing a precise measurement of 87 percent, said Joel Bergman, a University of Michigan researcher who was not involved in the work.

But the fact remains that the stuff has yet to be found.

New size estimate

The search for these strange particles will get a boost from a separate new study by John Arabadjis and Mark Bautz of the Massachusetts Institute of Technology. They used Chandra observations and computer modeling to set an upper limit on the size of dark matter particles per unit weight.

A dark matter particle that weighed as much as a penny could be no larger than one-tenth the size of a penny, the researchers concluded. They could not say how large the particles are.

The result is based on observations of exactly where dark matter resides in a single galaxy cluster. Arabadjis said dark matter particles would behave like a crowd of people in Times Square. The larger they are, the more spread out they would have to be.

Annex 13b

13

Toward the center of the galaxy cluster, however, he found the amount of dark matter increased more and more as observations approached the center, with no identifiable limit to the density. So he and Bautz placed a very high upper limit on the concentration of dark matter at the center – akin to putting many times more people in Times Square than it ever holds on New Year's Eve. The only way you could do it without hurting someone is to enlist very, very small people.

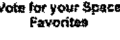
By analogy, the size of the dark matter particles must be very, very small for a given amount of mass, he said.

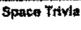
Bregmen called this finding "a great step forward" in allowing researchers to figure out exactly what dark matter particles are.

About dark matter

Scientists assume dark matter is composed of some sort of tiny, invisible, elementary particle that exerts a gravitational force but otherwise interacts weakly with normal matter. Some of these particles are likely wafting under your nose as you read this. These as-yet undiscovered particles are called WIMPS, for "weakly interacting massive particles."

Since the 1930s, astronomers have known that galaxy clusters do not contain enough visible matter to account for the gravity that causes the swift motions of their stars.





What is Dark Matter?

Strange stuff, to be sure. Here, we shed some light on the topic.

In addition, the gravity generated by observed matter is not enough to keep individual galaxies and clusters of galaxies from simply coming unglued.

Earlier this year, researchers discovered that some of what has long been called dark matter is quite normal – white dwarf stars that had simply eluded detection. These stars account for at least 3 percent of the previously missing matter in our galaxy, and possibly as much as 35 percent. But that still leaves much unfound.

Some of what was thought to be dark matter, researchers have realized in recent years, is simply the hot gas that fills the space between galaxies and can only be detected by X-ray telescopes.

But the Cambridge study shows there must still be a lot of WIMPS, or something even more exotic, holding everything together.

No collapse in sight

As scientists zero in on how dense the universe is, one overriding question remains in the back of their minds: Is it dense enough to hold everything together?

Astronomers know that the universe is expanding, and in recent years this expansion has been found to be accelerating.



The Space Top 10s



Vote for your Space Favorites



Space Trivia



Multimedia Features



SPACE.com Reader Favorites



Space Wallpapers

Annex 13c

13

Depending on how dense things are, this expansion will either continue forever, or it will reverse course and the universe will ultimately collapse.

Since galaxy clusters are thought to represent a significant chunk of the matter in the universe -- both normal and dark -- the Cambridge researchers say their study provides strong evidence for how dense the universe is as a whole.

Allen, who led the Cambridge study, said in an interview that his work confirms recent estimates of this density made by other researchers, and that it is only about 30 percent of what's needed to stop the universe from expanding forever.

"This reinforces the conclusions we've been getting in the past couple of years that the universe won't recollapse on itself," Allen said.

Cambridge scientists Robert Schmidt and Andrew Fabian also worked on the study.

Click here for more news and information about dark matter.



Space Video Collection

Space Image Gallery Collection

Annex 14

14

Scientists Closer To Solving Dark Matter Mystery

Tuesday, September 14, 1999

By Patricia Reaney

SHEFFIELD, England (Reuters) - Scientists said Tuesday they could be closer to understanding the mysterious subatomic particles that may make up the dark side of the universe.

Physicists believe so-called Weakly Interactive Massive Particles (WIMPs) could account for the 90-99 percent of the universe's dark matter which cannot be seen because it does not emit light.

One theory is that the dark matter consists of subatomic particles, so far undiscovered, that were produced in the Big Bang scientists say started the Universe. The particles, or WIMPS, fill space and hold the galaxies of stars together. With the help of ultra-sensitive detectors Sheffield University's Dr. Neil Spooner and his team have found "intriguing" signals in Europe's deepest salt mine, the Boulby mine, which they say could be the first signs of WIMPs.

''So far we have no explanation for them," Spooner told a news conference at a British science congress.

''The question one would ask is 'have we found WIMPS?' and the answer is 'not yet', but definitely these things are unexpected events...interestingly, another group has seen similar events at a similar rate so we're excited about this and have spent a long time investigating it," he added.

Spooner said there were two possible explanations. Once was that the signals could be the result of a problem in an instrument.

''The other explanation is that we haven't ruled out the possibility that we have seen something," he added.

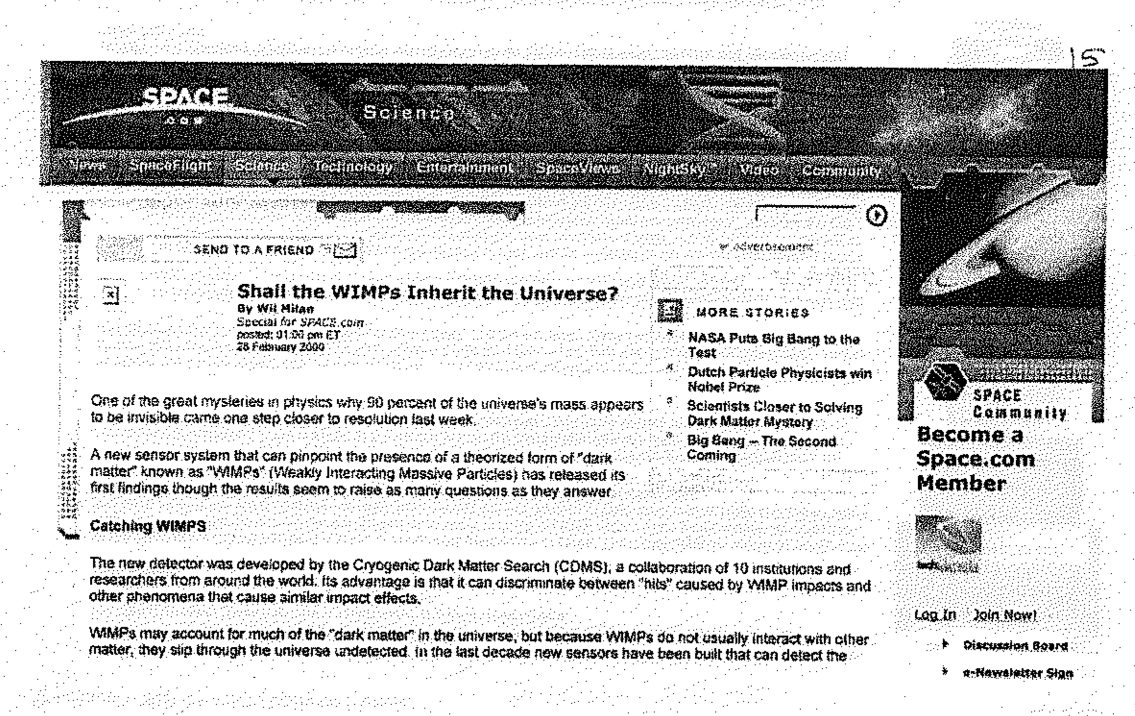
Spooner hopes further work and more advanced detectors may help solve the puzzle.

The scientists chose an underground location for their experiments because if the detectors had been on the surface at ground level, they could have detected other particles ranging from cosmic rays to natural radioactivity.

To see a WIMP, the underground detectors must be surrounded by a shielding material, which in northern England's Boulby mine is distilled water. The mine's depth blocks the cosmic rays and the water stops the natural activity of the rock.

Scientists say there is black matter because without its gravitational influence the universe would not exist.

Annex 15



SEND TO A FRIEND

Shall the WIMPs Inherit the Universe?

By Wil Milan
Special for SPACE.com
posted: 01:00 pm ET
28 February 2000

One of the great mysteries in physics why 90 percent of the universe's mass appears to be invisible came one step closer to resolution last week.

A new sensor system that can pinpoint the presence of a theorized form of "dark matter" known as "WIMPs" (Weakly Interacting Massive Particles) has released its first findings though the results seem to raise as many questions as they answer.

Catching WIMPS

The new detector was developed by the Cryogenic Dark Matter Search (CDMS), a collaboration of 10 institutions and researchers from around the world. Its advantage is that it can discriminate between "hits" caused by WIMP impacts and other phenomena that cause similar impact effects.

WIMPs may account for much of the "dark matter" in the universe, but because WIMPs do not usually interact with other matter, they slip through the universe undetected. In the last decade new sensors have been built that can detect the

MORE STORIES

- NASA Puts Big Bang to the Test
- Dutch Particle Physicists win Nobel Prize
- Scientists Closer to Solving Dark Matter Mystery
- Big Bang -- The Second Coming

Annex 15a

presence of WIMPs by detecting their sporadic impacts on other atomic particles, but these sensors have been hampered by many "false hits" due to cosmic rays and other phenomena.

How it works

At the heart of the CDMS sensor is a mass of silicon and germanium crystals. The CDMS detector works by sensing the recoil energy when a particle strikes the nucleus of an atom in these crystals, each impact being sensed as ionization and heat. Heat is the result of atoms vibrating, but normally the tiny amount of heat caused by a single tiny impact would make such a small difference in the temperature of the sensor that it would not be detectable.

But that is where the cryogenic feature of the detector comes in: By cooling the crystals almost to absolute zero, the normal atomic vibrations in the material of the sensor are almost completely stopped. With the normal heat vibration virtually stopped, any vibrations caused by a particle impact become much more evident and they can be counted as "hits."

However, the CDMS sensor can not only count hits, it can also tell what kind of "hit" it was. By carefully measuring the amount and type of energy released by each impact, it can tell if the impact was that of common radiation (such as beta and gamma rays) or of a heavy particle such as a WIMP. The sensor does this in two ways:

- It measures the level of ionization caused by each impact. Beta and gamma ray impacts cause relatively high levels of ionization, and thus any such impacts can be eliminated as not being WIMP impacts.
- In addition, the detector can measure the amount of heat energy released by the impact and therefore tell if it was a heavy-particle impact on an atomic nucleus, which could be due to a WIMP. It's analogous to listening to bullets striking a heavy metal plate: A small-caliber bullet would barely affect the metal plate, while a big bullet would set it ringing like a gong. The CDMS detector can measure the amount of "ringing" caused by each impact (measured as heat from the detector) and thereby tell if the impact was caused by a light impact (such as from a gamma ray) or from a heavy particle such as a WIMP.

Deafening silence

And yet, to date the main finding of the detector has been nothing. In its first year of operation the CDMS detector has recorded 13 nuclear impacts -- most or all of which could be explained by things other than WIMPs. However, this finding is itself quite significant because it is at odds with results from an earlier type of WIMP detector that seemed to yield many more hits.

The large discrepancy may seem strange, but even stranger is that both results may be correct. According to Dr. Bernard Sadoulet, one of the researchers involved in the project, "[The] physics for this unknown particle may be different from what we expect, and it is theoretically possible that we are both right!"

Up

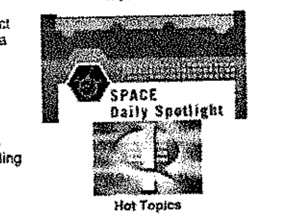
15



Starry Night® 4-DVD Gift Set

$49.95

Explore More



Hot Topics

Annex 15b

15

WIMPs winning, MACHOs losing

The quest to verify WIMP theory recently became more urgent because of the partial demise of its competitor, which is known as MACHO theory. The theory of MACHOs (MAssive Compact Halo Objects) holds that the "missing matter" is not made up of elusive subatomic particles, but by galaxies having a "halo" of plain old everyday matter that happens to be dark and therefore invisible. This would include burned-out dark stars, stray planets and other large, heavy, but dark clumps of common everyday matter. Such objects would be invisible to telescopes, but if they were ubiquitous throughout the universe they could account for the "missing matter."

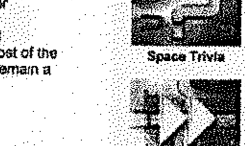
To confirm the existence of MACHOs, telescopes have been set up to watch for the brief "eclipses" caused by these dark objects moving in front of distant stars. But after more than five years of searching, very few potential MACHOs have turned up, and MACHO researchers recently reported that they now believe that MACHOs cannot account for most of the "missing matter."

The elimination of MACHOs as the primary explanation of the "missing matter" is providing additional impetus for improved WIMP theories and WIMP detectors. Plans are already underway for larger WIMP detectors, while theoreticians race to find new theories that would explain the conflicting results, as well as help devise improved detectors. The potential end result confirmation of the existence of a whole new type of matter that makes up most of the universe would have enormous implications for our understanding of the universe, and thus this is expected to remain a hot research area for years to come.

The Space Top 10s

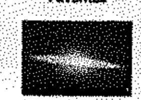
Vote for your Space Favorites

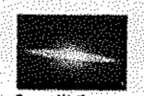
Space Trivia



Multimedia Features

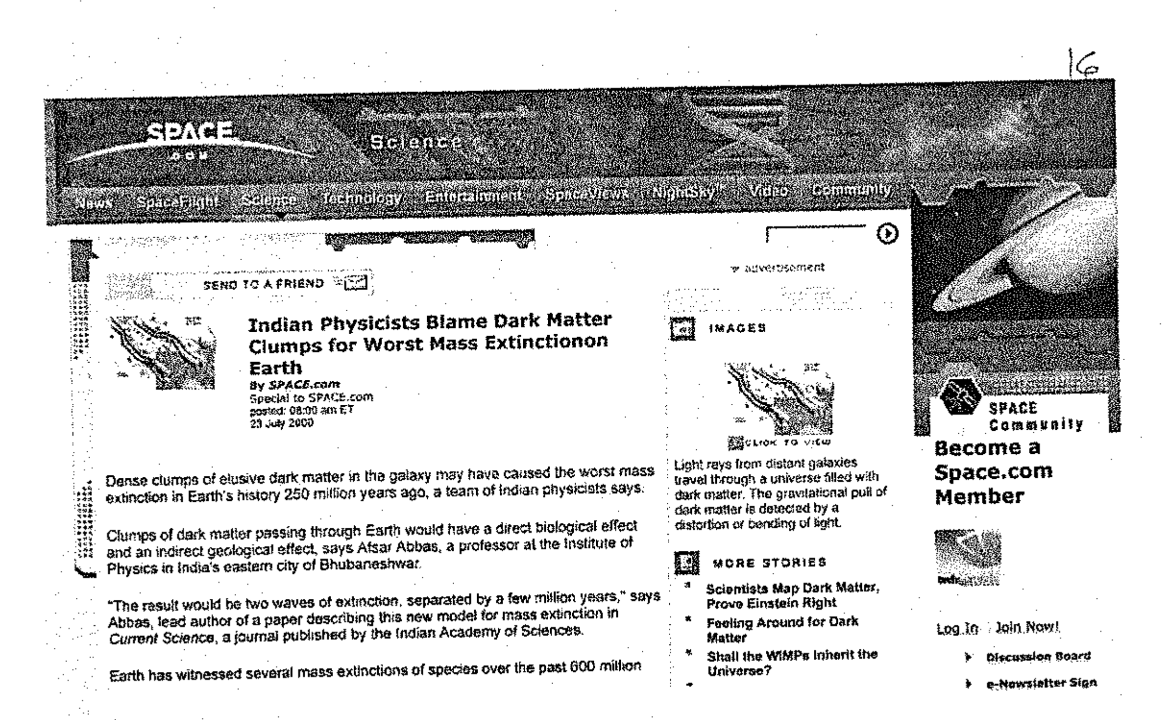
SPACE.com Reader Favorites





Space Wallpapers

Annex 16



16

SEND TO A FRIEND

Indian Physicists Blame Dark Matter Clumps for Worst Mass Extinctionon Earth

By *SPACE.com*
Special to SPACE.com
posted: 08:00 am ET
23 July 2000

Dense clumps of elusive dark matter in the galaxy may have caused the worst mass extinction in Earth's history 250 million years ago, a team of Indian physicists says.

Clumps of dark matter passing through Earth would have a direct biological effect and an indirect geological effect, says Afsar Abbas, a professor at the Institute of Physics in India's eastern city of Bhubaneshwar.

"The result would be two waves of extinction, separated by a few million years," says Abbas, lead author of a paper describing this new model for mass extinction in *Current Science*, a journal published by the Indian Academy of Sciences.

Earth has witnessed several mass extinctions of species over the past 600 million

IMAGES

CLICK TO VIEW

Light rays from distant galaxies travel through a universe filled with dark matter. The gravitational pull of dark matter is detected by a distortion or bending of light.

MORE STORIES

- Scientists Map Dark Matter, Prove Einstein Right
- Feeling Around for Dark Matter
- Shall the WIMPs Inherit the Universe?

Annex 16a

years; the worst of these was the Permian event 250 million years ago that wiped out 90 percent of marine species and 70 percent of life on land.

The cause of the Permian mass extinction has been under debate, with previous theories ranging from severe climatic fluctuations to volcanic eruptions to an Earth-asteroid impact.

"This hypothesis should motivate experiments to detect biological effects of dark matter."

In the mid-1990s, a Chinese-American team showed that the Permian mass extinction was actually a binary extinction -- an event that involved two pulses of extinction separated by about 5 million years.

"This new model is interesting because it explains the binary event," says the Chinese team-member Xiangning Yang, now a professor at the department of Earth sciences at Nanjing University in China.

Abbas says the dark-matter model predicts two extinction pulses. "The first is caused by the direct interaction of dark-matter particles with living organisms, and the second is caused by long-lasting volcanic eruptions triggered by dark matter at the Earth's core," Abbas says.

From studies of galactic dynamics, astronomers have known for several decades that over 90 percent of the universe is invisible dark matter. Some of this is made up of dead and unborn stars, black holes and planets.

But candidates for dark matter also include weakly interacting massive particles (WIMPS), relics of the Big Bang. The dark-matter model of mass extinction is based on the interaction of WIMPS as Earth passes through dense clumps of these exotic particles.

--

With the Milky Way enveloped in a dark matter halo, the Earth would always experience a WIMPS wind as the sun moves through the galaxy, but the mass-extinction effect occurs only when the planet encounters highly dense, clumped dark matter.

"The density of particles within clumps is expected to be up to a billion times higher than within the halo," says Abbas.

The first extinction pulse would be the result of mutagenesis, leading to fatal mutations and cancers in living organisms on a global scale caused by interaction of WIMPS with biological tissues, says Abbas.

Annex 16b

"This is a nice concept. I'd expect mutagenesis would be the first thing to happen during Earth's interaction with a dark-matter clump," says Konstantin Zioutas, professor of experimental physics at the University of Thessaloniki in Greece. "This hypothesis should motivate experiments to detect biological effects of dark matter," Zioutas told *SPACE.com*.

Zioutas had been the first to suggest 10 years ago that the interaction of dark-matter particles with nuclei in biological tissues may lead to genetic damage and mutations. He says not just WIMPS but axions -- another candidate particle for dark matter -- may also interact with biological tissues to cause genetic damage.

The secondary, delayed effect of the WIMPS would be intense volcanic activity. During the passage of the clump through Earth, particle annihilation would generate enormous heat at the Earth's core. This heat would gradually rise to the surface and manifest itself as volcanic activity that would lead to the second pulse of extinction of species.

This scenario fits in well with previous theories that associated the Permian mass extinction with volcanic eruptions that lasted up to a million years in what is present-day Siberia. The volcanoes belched out ash, carbon dioxide and sulfur dioxide, precipitating a global cooling -- also previously associated with the mass extinction.

Clumped dark matter may be an additional heat source for planetary bodies and thus may have left calling cards elsewhere in the solar system.

Both extinction pulses would contribute to dramatic reduction in oxygen levels on Earth, a condition called anoxia, known to have been associated with the Permian mass extinction. Paleontologists have suspected that besides the Permian event, the Devonian extinction, which took place around 360-million years ago, was also marked by two pulses, separated by around a few million years.

"The fact that there are double extinction episodes separated by roughly the time it takes for this heat to arrive at the Earth's crust and that the second extinction is correlated with volcanism is a highly enticing signature," says Juan Collar, a physicist at the University of Paris. Collar had first proposed a link between dark matter and extinction four years ago, arguing that the effect of a WIMPS clump on living organisms would roughly be like that of neutron radiation from a close nuclear explosion protracted over the time it took the Earth to cross the clump.

"Satellite experiments are now coming online to look for the characteristic gamma radiation from annihilations in these clumps," says Collar. "If we get evidence for clumpy dark matter halo, the dark matter-induced extinction scenario would be almost inevitable."

"This is a testable prediction of the model -- if clumped dark matter passed through the solar system, there may be relics of heating episodes on planetary bodies," says Abbas.

The enigmatic magnetic field on Ganymede, for instance, points to a molten interior.

Annex 17

Spaceflight Now | Breaking News | Supernova found to confirm accelerating universe



HOME ■ CURRENT MISSION ■ PLUS ■ NEWS ARCHIVE ■ LAUNCH SCHEDULE ■ ASTRONOMY NOW ■ STORE ■ SEARCH

17

Supernova found to confirm accelerating universe

BY JEFF FOUST
SPACEFLIGHT NOW
Posted: April 3, 2001

The serendipitous discovery of a distant supernova has confirmed that the universe is expanding at an accelerating rate because of the presence of a pervasive, mysterious "dark energy," astronomers reported Monday.

The supernova -- the most distant yet located, some 11 billion light years from the Earth -- shows that the universe was expanding at a decelerating rate early in its history, and only more recently started to accelerate as a poorly-understood repulsive force started to win out over gravity.

http://spaceflightnow.com/news/n0104/03supernova/

Annex 17a

Using Hubble, astronomers pinpointed a blaze of light from the farthest supernova ever seen, called 1997ff. This panel of images shows the supernova's cosmic neighborhood; its home galaxy; and the dying star itself. Astronomers found this supernova in 1997 during a second look at the northern Hubble Deep Field (top panel). The image shows the myriad of galaxies Hubble spied when it peered across more than 10 billion years of time and space. The white box marks the area where the supernova dwells. The photo at bottom left is a close-up view of that region. The white arrow points to the exploding star's home galaxy, a faint elliptical. The picture at bottom right shows the supernova itself, distinguished by the white dot in the center. Photo: NASA, Adam Riess (Space Telescope Science Institute, Baltimore, MD)

"This is a very significant development in our understanding of the universe," Michael Turner, a University of Chicago astrophysicist, said at a NASA press conference Monday afternoon where the discovery was announced.

Annex 17b

17

Astronomers first raised the possibility of an accelerating universe a few years ago based on evidence from a class of supernova explosions known as Type Ia. Such supernovae always explode with the same absolute brightness, allowing astronomers to compute their distance by measuring their apparent brightness: the dimmer the supernova, the more distant it must be. Combined with measurements of the supernova's redshift, or how fast it was receding from the Earth, astronomers could understand how the expansion rate of the universe changed over time.

To their surprise, astronomers found several years ago that the expansion of the universe was not slowing down, as had been assumed, but was actually accelerating under the influence of an unknown force. "It was so startling that a lot of people were very skeptical about it and other possibilities were suggested," explained Adam Riess, the Space Telescope Science Institute (STScI) astronomer who led the current investigation. Those alternatives included clouds of dust between the supernovae and Earth and the possibility that Type Ia supernovae are not the "standard candles" they are assumed to be but in fact vary in brightness.

Testing these hypotheses required observing more distant supernovae, a challenge as even brilliant supernovae become dim and difficult to detect at great distances. A turn of good luck, though, helped Riess and colleagues find such a supernova. In late 1997 STScI astronomer Ron Gilliland used the Hubble Space Telescope to revisit a region of the sky known as the Hubble Deep Field studied two years earlier by the orbiting telescope. By comparing the original Hubble Deep Field images with his new observations, he discovered a bright pinpoint of light visible in 1997 that did not exist in 1995: a distant supernova, designated 1997ff.

That single data point was not enough, however, to determine

Annex 17c

17

the supernova's distance or redshift. However, Riess discovered last year that the same region of the sky was studied just a few weeks after Gilliland's observations with an infrared camera on Hubble. Those images, taken over the course of a month, allowed Riess and colleagues to measure the supernova's brightness and redshift, and confirm that it was associated with a massive elliptical galaxy visible in the Hubble images that was more than 10 billion light years away.

The redshift of the distant supernova did not match models based on dust or varying brightness of Type Ia supernovae. It did, though, closely match models based on an accelerating universe, a vindication of those earlier observations. "We now have great confidence that the universe is accelerating today," said Riess.

"This supernova has driven a stake through the heart of two conventional explanations that tried to avoid a cosmological speedup," added Turner.

Annex 18

18

This diagram shows how the universe slowed down and then revved up since the Big Bang. The concentric red circles denote that galaxies are migrating apart at a slower rate during the first half of the cosmos. Then a mysterious, dark force overcame gravity and began pushing galaxies apart at an ever-faster rate, signified by the green circles. Astronomers found evidence of the universe's deceleration when they observed the farthest supernova ever seen, which detonated so long ago that the universe was still slowing down. Photo: Ann Feild (STScI)

While astronomers are more confident that the universe is accelerating, they still have little idea why it is accelerating. Their best guess is that a mysterious energy force dubbed "dark energy" -- which may make up to two-thirds of the universe and whose gravity is repulsive, not attractive -- is overwhelming the gravitational force of normal matter and

Annex 18a

18

this causes the universe to expand at an ever-faster rate.

At the time supernova 1997ff exploded, the expansion of the universe was still decelerating from the Big Bang as gravity was the dominant force in a smaller universe. However, about four to eight billion years ago the universe expanded to the point where the repulsive force from the dark energy became greater than the weakening force of gravity, causing the expansion rate to accelerate.

Such a repulsive force is supported by Einstein's theory of General Relativity, which includes a "cosmological constant" factor originally introduced by Einstein to counteract the attractive force of gravity and create a static universe. That theory, though, gives little guidance on what could generate a repulsive force.

Turner said that this mysterious force is more like energy than matter because it is spread evenly between galaxies, hence the "dark energy" moniker. "More conservative" explanations for the dark energy, he said, include virtual particles in a quantum vacuum and the influence of hidden dimensions predicted by superstring theory. "This is very weird stuff," he noted.

To better understand dark energy and its influence on the expansion of the universe may require years or decades of additional studies with new instruments and telescopes that can peer even deeper into the universe than Hubble can. Turner believes it is the "number one problem" in both physics and astronomy today, and considers the discovery of the accelerating universe one of the biggest discoveries in astronomy since Edwin Hubble discovered the expansion of the universe.

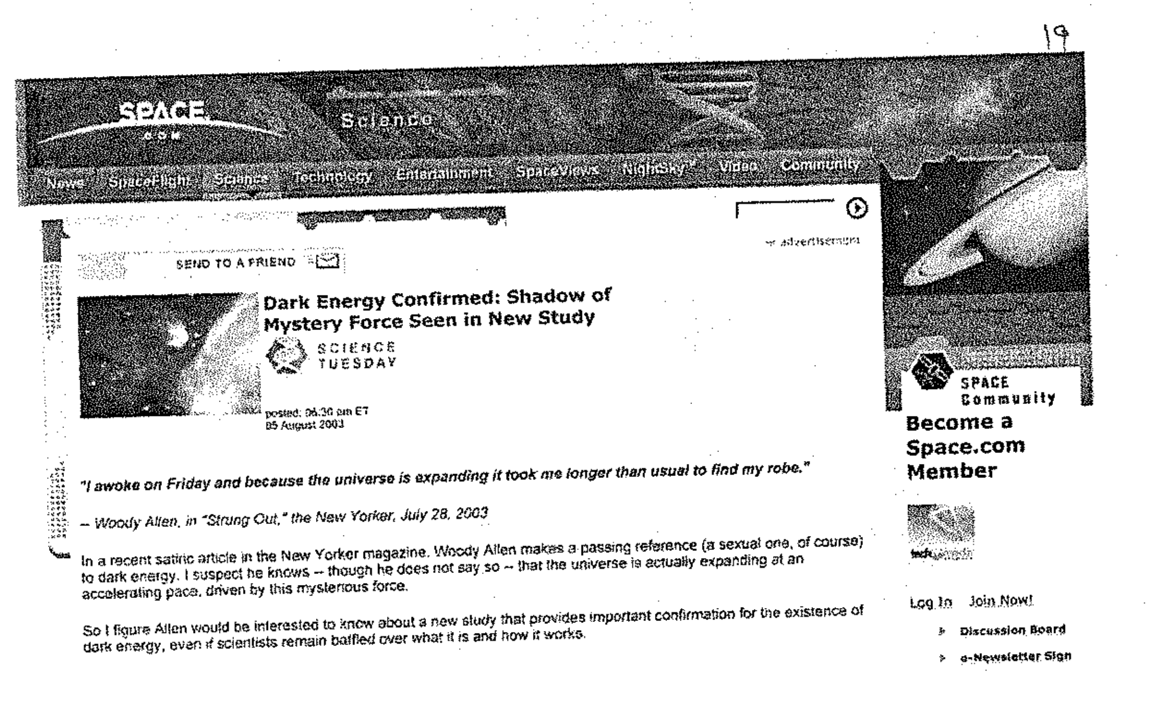
"The discovery that the universe is speeding up and not slowing down," Turner said, "will be viewed as one of the

Annex 18b

18

most important discoveries in all of science in the past 25 years."

Annex 19



Dark Energy Confirmed: Shadow of Mystery Force Seen in New Study

SCIENCE TUESDAY

posted: 06:30 am ET
05 August 2003

"I awoke on Friday and because the universe is expanding it took me longer than usual to find my robe."

– Woody Allen, in "Strung Out," the New Yorker, July 28, 2003

In a recent satiric article in the New Yorker magazine, Woody Allen makes a passing reference (a sexual one, of course) to dark energy. I suspect he knows -- though he does not say so -- that the universe is actually expanding at an accelerating pace, driven by this mysterious force.

So I figure Allen would be interested to know about a new study that provides important confirmation for the existence of dark energy, even if scientists remain baffled over what it is and how it works.

Annex 19a

Whereas gravity attracts, dark energy repels (or sucks, depending on whether its viewed as an internal or external force relative to the universe). Theorists have no clue what's behind this antigravity, but they say it fuels an increased pace by which all galaxies in the universe recede from one another. The end result, as best as they can figure, is a lonely universe in which folks in one galaxy can no longer see or hear from the folks in other galaxies because they're moving away at the speed of light. able -->

Or perhaps, one fantastic theory posits, the acceleration will ultimately shred all matter in a Big Rip.

Observations of dark energy have so far been very indirect, limited to examining the light from distant supernovae to determine the state of the expansion at the time the light left the exploded stars.

The new study employed an entirely different method. Researchers compared millions of galaxies imaged by the Sloan Digital Sky Survey with a temperature map of the early universe recently developed with data collected by NASA's Wilkinson Microwave Anisotropy Probe (WMAP).

Dark energy's shadow

The researchers say they found dark energy's shadow on the cosmic microwave background radiation, a relic of the earliest epoch of the universe after the Big Bang that supposedly started it all.

Let's back up: The theorists theorized about what would happen to the microwave radiation over time, if there was dark energy and if there was not.

They determined that dark energy should leave a certain imprint, and it did.

Photons streaming from the cosmic microwave background, across time, pass through many concentrations of galaxies and dark matter, explained study team member Andrew Connolly of the University of Pittsburgh. As the photons fall into a gravitational well created by a large cluster of galaxies, they gain energy -- just like a ball rolling down a hill. As they come out they lose energy.

Photographic images of the microwaves become more blue (i.e. more energetic) as they fall in toward a well and become more red, or less energetic, as they climb away.

SCIENCE TUESDAY

Visit SPACE.com to explore a new science feature each Tuesday.

>>Go to Science Tuesday archive page

Images



CLICK TO VIEW

History of expansion: A rough picture of how the universe's expansion decelerated, then began to accelerate. Fate is not known.

Related SPACE.com STORIES

* Dark Energy: Astronomers Hot on Trail of Mysterious Force
* 'Astounding' Findings Pin Down Age of Universe, Birth of First Stars
* All Galaxies to Become Ghosts, Frozen in Time and Space
* Strings Attached: New Study Puts Limits on Physics of Extra

Annex 19b

19

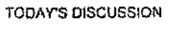
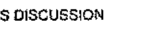
"In a universe consisting mostly of normal matter one would expect that the net effect of the red and blue shifts would cancel," said Albert Stebbins of the Fermi National Accelerator Laboratory. "However in recent years we are finding that most of the stuff in our universe is abnormal in that it is gravitationally repulsive rather than gravitationally attractive."

Welcome new data

The research, announced last month, shows that "dark energy, whatever it is, is something that is not attracted by gravity even on the large scales probed by the Sloan Digital Sky Survey," said David Spergel, a Princeton University cosmologist and a member of the WMAP science team. "This is an important hint for physicists trying to understand the mysterious dark energy."

Dimensions

- The Universe: Still Boggling the Minds of 'Finite Creatures'

TODAY'S DISCUSSION

What do you think of this story?

>>Uplink your views

John Blakeslee of Johns Hopkins University recently led a separate study of two very distant supernovae that helped pin down the timing of a switch from deceleration to acceleration in the universe, which occurred about 6.3 billion years ago. (Yes, the universe has always been expanding, but not always at an accelerating rate.)

Blakeslee told *SPACE.com* the Sloan result "provides an important consistency check" for assumptions about dark energy.

But are we sure now that dark energy exists as it has been described? "There still is some room for doubt," Blakeslee said

If dark energy baffles the smartest scientists -- and it does -- then the rest of us can be excused for wondering what all this means to the evolution and fate of the universe. We can even be excused for not comprehending any of this. Woody Allen claims his grasp of general relativity and quantum mechanics "now equals Einstein's -- Einstein Moomjy, that is, the rug seller."

And Moomjy knows the source of dark energy just about as well as anyone.

- **All About Dark Energy**
- **Space Myths, Mysteries & Hoaxes**
- **Space Mailbag**

Marketplace Links



The Space Top 10s



Vote for your Space Favorites



Space Trivia

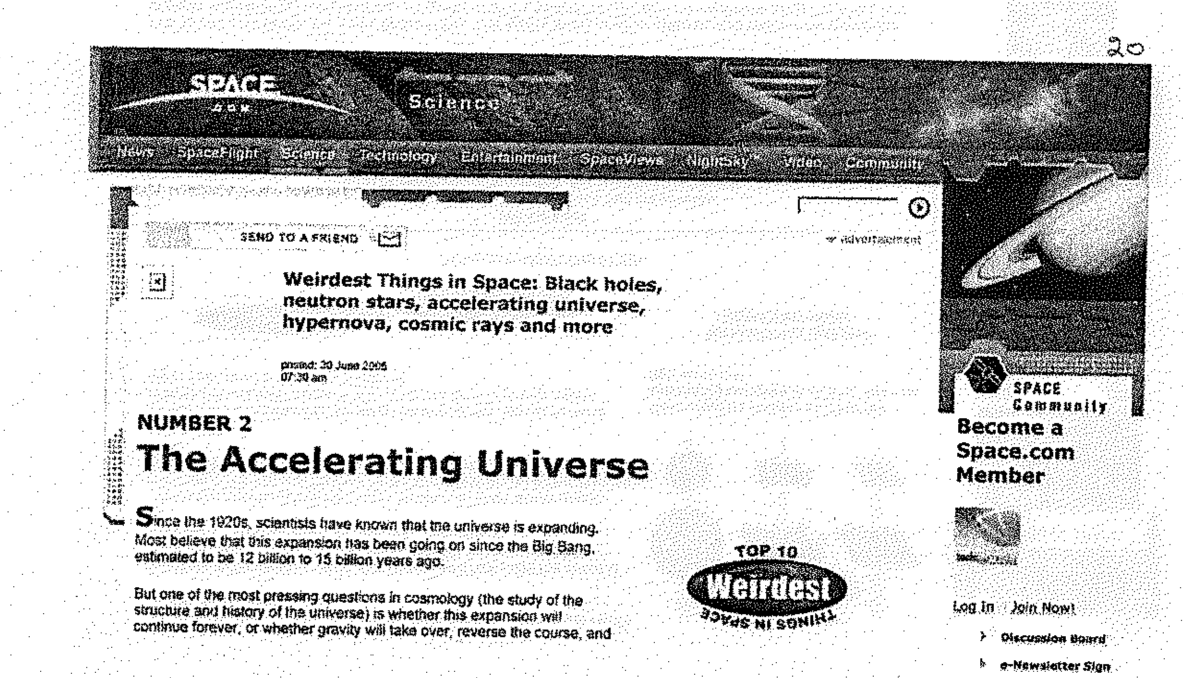


Multimedia Features

SPACE.com Reader Favorites

Space Wallpapers

Annex 20



SPACE.com -- Weirdest Things in Space: Black holes, neutron stars, accelerating universe, hypernova, cosmic rays and more — Page 1 of 6

SPACE.com — Science

News | SpaceFlight | Science | Technology | Entertainment | SpaceViews | NightSky | Video | Community

SEND TO A FRIEND

Weirdest Things in Space: Black holes, neutron stars, accelerating universe, hypernova, cosmic rays and more

posted: 30 June 2005
07:30 am

NUMBER 2

The Accelerating Universe

Since the 1920s, scientists have known that the universe is expanding. Most believe that this expansion has been going on since the Big Bang, estimated to be 12 billion to 15 billion years ago.

But one of the most pressing questions in cosmology (the study of the structure and history of the universe) is whether this expansion will continue forever, or whether gravity will take over, reverse the course, and

TOP 10 Weirdest THINGS IN SPACE

SPACE Community
Become a Space.com Member
Log In | Join Now!
Discussion Board
e-Newsletter Sign

http://www.space.com/scienceastronomy/top_10_weird_list-2.html — 26/05/31

Annex 20a

pull all of the galaxies back together into a Big Crunch, which would signify the end of time as we know it.

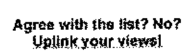
Suddenly, in the past two years, something weird has made the question loom even larger: The expansion of the universe, according to two independent studies, seems actually to be accelerating.

"This is completely unexpected," says Morris Aizenman, senior science associate in the National Science Foundation's Mathematical and Physical Science Directorate. "What force is causing that acceleration? We have no answer."

Researchers speculate that the acceleration might be caused by some strange and unknown matter or energy whose force of gravity *repels*, rather than attracts, over long distances.



Cosmologists ponder whether our expanding universe is closed, open or flat. IMAGE: LBNL



Agree with the list? No? Uplink your views!

Return to the Main Weird Page



Weird Fact
Albert Einstein was first to conclude that the universe must be expanding or contracting. But he tossed the "flawed" idea out and rewrote his general theory of relativity.

More About The Accelerating Universe

Anything that has mass also has gravity, and this force of gravity is exerted across infinite space, decreasing with distance. You, for example, exert a tiny gravitational pull on distant planets and galaxies, and they pull on you.

And so you, your family, this Earth, and our Milky Way galaxy all tug on other galaxies. Eventually, even though the universe is expanding in all directions, the gravity of all the galaxies should slow the expansion, bring it to a halt, and then pull all matter back together.

Unless, somehow, some force can overcome this "normal" gravity.

Annex 20b

20

Over the past decade, scientists have become increasingly convinced that some form of "dark matter" permeates the universe, accounting for phenomena seen in space that could not occur based on the amount of observable matter. But even this dark matter can't account for an accelerating universe.

Instead, some have proposed, there must be small forces at work in even the smallest "empty" spaces, inside your body, in the air and around the universe -- a kind of antigravity which, over long distances, pushes other stuff away.

Meanwhile, while the case for an accelerating universe is very strong, more evidence is needed. But even if it turns out wrong, cosmologists say that the expansion isn't slowing down as fast as it should be, based on what they know about mass and gravity. *Something* weird is going on.

"More observations need to be made," Aizenman says, adding that whole new theories and explanations will likely result.

NASA's MAP mission, set for launch this spring, will measure small fluctuations in the temperature of a ubiquitous background of cosmic microwave radiation, which is thought to have formed just 500,000 years after the Big Bang. A proposed satellite called SNAP (SuperNova / Acceleration Probe) would map the expansion rate of the universe at epochs varying from the present to 10 billion years ago.

Gathering such information with missions like these is expected to reveal the size, shape, content, age and fate of the universe.

Related Information

Bigger Faster: Universe Expansion May Be Accelerating

Big Bang Theory Warmed by Ancient Heat Discovery

Cosmic Yardsticks: Pulsing Stars Unlock Universe's Secrets

VIDEO: Voyage Through the Cosmos

Other Weird Things

A Glowing Discovery at the Forefront of Our Plunge Through Space

Abrupt End to Journey of an Interstellar Dust Grain

18 Homeless Planets Discovered

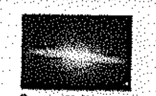
The Space Top 10s

Vote for your Space Favorites

Space Trivia

Multimedia Features

SPACE.com Reader Favorites



Space Wallpapers

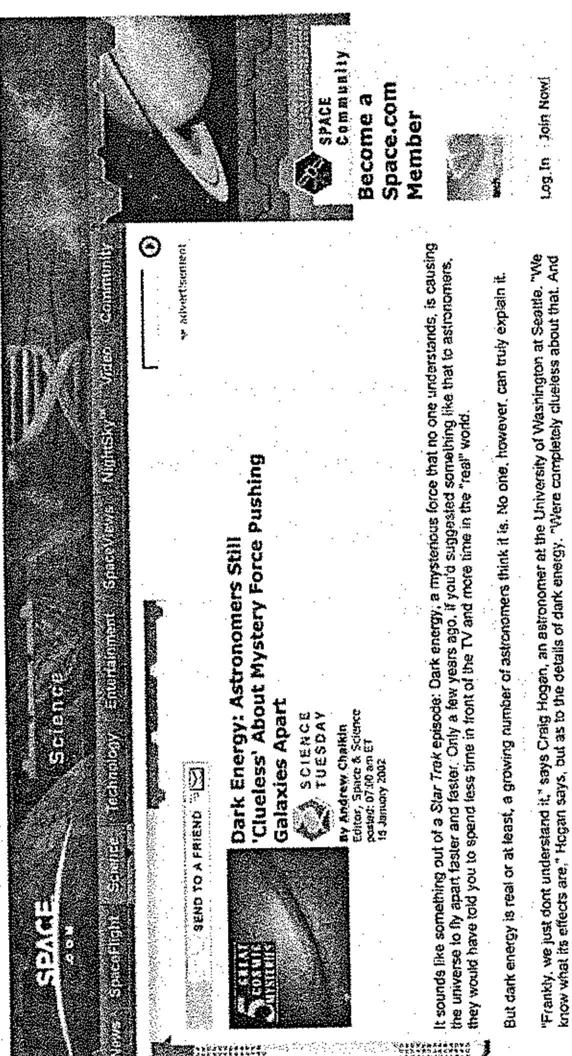
Return to the Main Weird Page Next Weird Thing

1 2 3 4 5 6 7 8 9 10 | >> Continue with this story >

Annex 21

SPACE.com — Dark Energy: Astronomers Still 'Clueless' About Mystery Force Pushing Galaxies Apart

Page 1 of 6



Dark Energy: Astronomers Still 'Clueless' About Mystery Force Pushing Galaxies Apart

SCIENCE TUESDAY

By Andrew Chaikin
Editor, Space & Science
posted: 07:00 am ET
15 January 2002

It sounds like something out of a *Star Trek* episode: Dark energy, a mysterious force that no one understands, is causing the universe to fly apart faster and faster. Only a few years ago, if you'd suggested something like that to astronomers, they would have told you to spend less time in front of the TV and more time in the "real" world.

But dark energy is real or at least, a growing number of astronomers think it is. No one, however, can truly explain it.

"Frankly, we just dont understand it," says Craig Hogan, an astronomer at the University of Washington at Seattle. "We know what its effects are," Hogan says, but as to the details of dark energy, "Were completely clueless about that. And

Annex 21a

21

everybodys clueless about it."

Dark energy entered the astronomical scene in 1998, after two groups of astronomers made a survey of exploding stars, or supernovas, in a number of distant galaxies. These researchers found that the supernovas were dimmer than they should have been, and that meant they were farther away than they should have been. The only way for that to happen, the astronomers realized, was if the expansion of the universe had sped up at some time in the past.able -->

Until then, astronomers had generally believed that the cosmic expansion was gradually slowing down, due to the gravitational tugs that individual galaxies exert on one another. But the supernova results implied that some mysterious force was acting against the pull of gravity, causing galaxies to fly away from each other at ever greater speeds.

It was a stunning realization.

At first, other researchers questioned the result; perhaps the supernovas were dimmer because their light was being blocked by clouds of interstellar dust. Or maybe the supernovas themselves were intrinsically dimmer than scientists thought. But with careful checking, and more data, those explanations have largely been put aside, and the dark energy hypothesis has held up.

In one sense, the idea is not completely new. Einstein had included such an "anti-gravity" effect in his theory of general relativity, in his so-called cosmological constant. But Einstein himself, and later many other astronomers, came to regard this as a kind of mathematical contrivance that had little relationship to the real universe. By the 1990s no one expected that the effect would turn out to be real.

Still, anti-gravity isnt the right way to describe dark energy, says Virginia Trimble of the University of Southern California at Irvine.

"It doesnt act opposite to gravity," Trimble says. "It does exactly what general relativity says it should do, if it has negative pressure."

Trimble has a fairly simple way of imagining the phenomenon.

"If you think in terms of the universe as a very large balloon," she says, "when the balloon expands, that makes the local density of the [dark energy] smaller, and so the balloon expands some more . because it exerts negative pressure.

SCIENCE TUESDAY

Visit SPACE.com to explore a new science feature each Tuesday.

>>Go to Science Tuesday archive page

Images

CLICK TO VIEW

This chart shows how much of the universe is made up of dark energy, dark matter, and ordinary matter.

CLICK TO VIEW

This diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago. The more shallow the curve, the faster the rate of expansion. The curve changes noticeably about 7.5 billion years ago, when objects in the universe beg

Annex 21b

21

While its inside the balloon its trying to pull the balloon back together again, and the lower the density of it there is, the less it can pull back, and the more it expands. This is what happens in the expanding universe."

The supernova evidence suggests that the acceleration kicked in about 5 billion years ago. At that time, galaxies were far enough apart that their gravity (which weakens with distance) was overwhelmed by the relatively gentle but constant repulsive force of dark energy. Since then, dark energy's continuing push has been causing the cosmic expansion to speed up, and it seems likely now that this expansion will continue indefinitely.

"It means that if you look out at the universe today, and if we wait many billions of years," says Hogan, "everything will be flying away faster and faster, and eventually well be left quite alone."

Aside from such grim forecasts, dark energy is causing quite a bit of upset for astronomers who have to adjust to an unexpected and outlandish new view of the universe. Already, they have had to accept the notion of dark matter, which is now thought to far outnumber ordinary matter in the universe, but which has never been detected in any laboratory. Now, the arrival of an unknown force that rules cosmic expansion has added insult to injury.



Related SPACE.com STORIES

- Astrophysics Challenged By Dark Energy Finding
- Farthest Supernova Detected, 'Dark Energy' Suspected
- 'Groundbreaking' Discovery: First Direct Observation of Dark Matter
- Understanding Dark Matter and Light Energy



TODAY'S DISCUSSION

What do you think of this story?

>>Uplink your views



The Space Top 10s



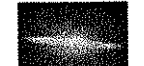
Vote for your Space Favorites



Space Trivia



Multimedia Features



SPACE.com Reader Favorites

Space Wallpapers

"I'm as big a fan of dark matter and dark energy as anybody else," says astronomer Richard Ellis of Caltech. But, he adds, "I find it very worrying that you have a universe where there are three constituents, of which only one [i.e., ordinary matter] is really physically understood."

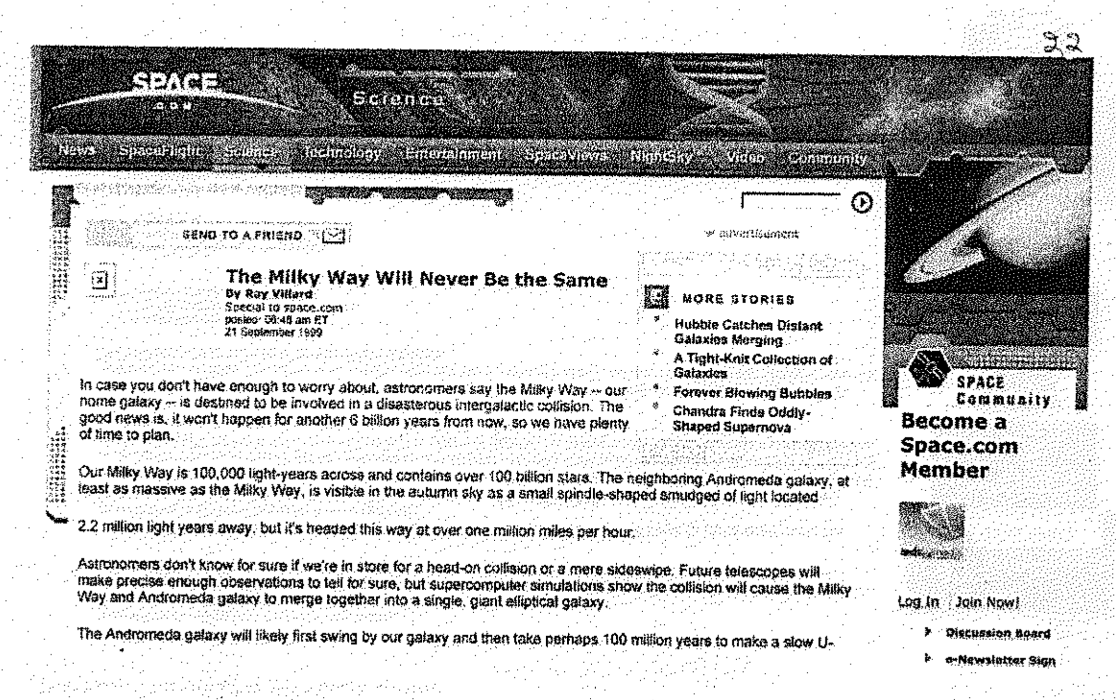
"When you teach undergraduates, and they say, 'Well, what is dark matter?' Well, nobody's really sure. 'What is dark energy?' We're even less sure. So you have to explain to a student, that 90 percent of the universe, 95 percent, is in two ingredients that nobody really understands," says Ellis. "This isn't really progress."

No one argues that dark energy is difficult to comprehend. And as Trimble points out, it is hardly the first strange idea scientists have had to accept.

"It took two generations for people to be comfortable with quantum mechanics," she says. "The fact that you do not have good intuition about [dark energy] is true for quantum mechanics, general relativity, and lots of other things, because we cant easily mock them up in the laboratory."

And for cosmologists, dark energy has solved at least one cosmological conundrum raised by studies of the Cosmic Microwave Background, or CMB.

Annex 22



The Milky Way Will Never Be the Same

By Ray Villard
Special to space.com
posted: 06:48 am ET
21 September 1999

MORE STORIES
- Hubble Catches Distant Galaxies Merging
- A Tight-Knit Collection of Galaxies
- Forever Blowing Bubbles
- Chandra Finds Oddly-Shaped Supernova

In case you don't have enough to worry about, astronomers say the Milky Way -- our home galaxy -- is destined to be involved in a disasterous intergalactic collision. The good news is, it won't happen for another 6 billion years from now, so we have plenty of time to plan.

Our Milky Way is 100,000 light-years across and contains over 100 billion stars. The neighboring Andromeda galaxy, at least as massive as the Milky Way, is visible in the autumn sky as a small spindle-shaped smudged of light located

2.2 million light years away, but it's headed this way at over one million miles per hour.

Astronomers don't know for sure if we're in store for a head-on collision or a mere sideswipe. Future telescopes will make precise enough observations to tell for sure, but supercomputer simulations show the collision will cause the Milky Way and Andromeda galaxy to merge together into a single, giant elliptical galaxy.

The Andromeda galaxy will likely first swing by our galaxy and then take perhaps 100 million years to make a slow U-

Annex 22a

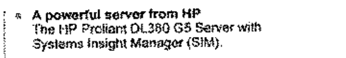
turn before plunging into the Milky Way's core.

Hubble Space Telescope views of spectacular collisions between other pairs of spiral galaxies in the universe have already given astronomers a preview of what's in store for the Milky Way.

The nighttime ribbon and stars and dust that marked the lanes of our Milky Way will begin to come apart under the gravitational tug-of-war between the two galaxies.

The sky will grow increasingly jumbled with shreds of black dust, glowing gas, and "superclusters" of brilliant blue stars. Cold, black molecular clouds will be compressed and heated until they burst apart in a firestorm of starbirth. Supernova explosions from the most massive of the newborn stars will pepper the heavens with titanic blasts going off like a string of firecrackers.

As the stars gravitationally settle into their new home, any hint of the Milky Way and Andromeda as majestic spiral galaxies will be gone. Far-future alien skywatchers will gaze into a rich starry sky and look all the way across space into the brilliant core of our newly formed elliptical galaxy.



Annex 23

Astrophysics Challenged By Dark Energy Finding

By Ray Villard
Special to SPACE.com
posted: 07:00 am ET
10 April 2001

A strange repulsive force of "dark energy" pervades every nook and cranny of the universe, a team of scientists said earlier this month, but the force not only pushes against the master force of gravity -- it also has astrophysicists' heads spinning.

While gravity gently binds planets, stars and galaxies together, dark energy tugs on the fabric of time and space, pushing galaxies apart ever faster and faster into the farthest reaches of the universe.

The evidence came in a recent Hubble space telescope observation of the most distant supernova (exploding star) ever detected. The record-breaking supernova appears brighter than it should if the universe had been expanding at a steady rate. The new finding suggests that a decelerating universe holds galaxies relatively close together and objects in them would have appeared brighter because they would be

IMAGES

CLICK TO VIEW

This chart shows how much of the universe is made up of dark energy, dark matter, and ordinary matter.

CLICK TO VIEW

This is a close-up view of the Hubble Deep Field image containing the farthest supernova. The white arrow points to the

Annex 23a

closer.

The trouble is that with this finding and others in the past three years, the universe is beginning to look like a complex witch's brew of dark energy, normal matter and dark matter (an invisible exotic form of matter).

"This starts to look incredibly ugly and complicated," says Mario Livio of the Space Telescope Science Institute. "I even wonder if we are we asking right questions."

'New ocean of discovery'

For other scientists, the new finding holds promise for astrophysics. Morris Aizenman, a senior science associate with the National Science Foundation, was so moved by the finding that he likened it to a Keats poem about Cortez' first sighting of the Pacific Ocean.

"It's an entire new ocean of discovery we're about to set out on and I feel that it's an extraordinary opportunity for the physics and astronomy community as we really start probing everything from the structure of an atom to the entire structure of the universe," Aizenman said. "It's all part of the same question."

The dark energy finding closes a loophole left by the second-greatest cosmological finding of the past century -- that the universe is not merely expanding (this is Edwin Hubble's finding of the 1920s, widely noted as the greatest cosmological finding of the past 100 years) but its expansion is accelerating.

Merely a year ago many astronomers were skeptical that the universe was accelerating, despite supernovae (exploded star) observations published in 1998 that suggested space is expanding faster today than long ago just the opposite of conventional cosmological wisdom.

Now, the observation of the farthest supernova ever detected now puts a "big nail in the coffin of alternative theories," says astrophysicist Michael Turner of the University of Chicago.

The dark energy confirmation comes on the heels of other closed loopholes that have shaken up the astrophysics world and lent more support to the accelerating universe idea. For instance, in the past three years, scientists have discovered that the universe is basically flat. This finding and others are knocking down an explanation for variations in the brightness of supernovae -- that some type of cosmic dust simply absorbs the light.

exploding star's home galaxy, a faint elliptical. Its redness is due to the billions of old stars residing there.



CLICK TO VIEW

This diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago. The more shallow the curve, the faster the rate of expansion. The curve changes noticeably about 7.5 billion years ago, when objects in the universe beg

MORE STORIES

- **Farthest Supernova Detected, 'Dark Energy' Suspected**
- **'Groundbreaking' Discovery: First Direct Observation of Dark Matter**
- **Most of Universe"s Matter Still MIA**
- **Galaxies Made of Nothing? New Theory of Mysterious Dark Matter**

Annex 23b

23

Upheaval for physics

Saul Perlmutter, who headed up the first group to publish its findings on the accelerating universe three years ago, said the confirmation of dark energy will spark an entirely new brand of physics.

"Dark energy is something we have no clue as to what is causing it, and it doesn't fit into current physics theories, and they have to develop new approaches to explain it," said Perlmutter, an astrophysicist at the Lawrence Berkeley National Laboratory. "That's exciting. It's rare that we get to do this."

In 1917, Albert Einstein first imagined a repulsive force pervading space, which later came to be called the "cosmological constant." Like a 20th-century version of the mythological Atlas, Einstein sought to shore up the universe by keeping stars from falling together under gravity. Einstein fudged his relativity equations to add a repulsive force under certain conditions in space. This would keep the universe eternally balanced at a "steady state."

When astronomer Edwin Hubble discovered that the universe wasnt static but expanding, Einstein abandoned his cosmological constant and called it his biggest blunder. Astronomers kept Einsteins "fudge factor" locked away as a closet skeleton for decades.

"Now I have to take dark energy seriously whether I want to or not," said physicist Michael Dine of University of California, Santa Cruz.

Livio agreed. "Dark energy now becomes very central to our ideas about the universe," he said.

Percolating energy and quintessence

Although physicists have yet to say what dark energy is, they have some ideas about where it came from. Some say it could percolate from the vacuum of space. Laboratory experiments show that seemingly empty space is actually seething with virtual particles that wink in and out of existence.

This perpetually bubbling vacuum provides energy that could take the form of a repulsive "negative gravity," some say. The problem is that this vacuum-energy as calculated would be so absurdly powerful that it would have blown apart the universe very long ago. One way out is to assume that the vacuum-energy vastly weakens over time and is not constant as imagined by Einstein.

This leads to another idea called "quintessence" (for "fifth essence") which proposes a repulsive field embedded in space, not unlike a gravitational field or a magnetic field.

Under that hypothesis, the field was created in the early moments of the universe along with the other forces in nature, and now stretches across the universe like a spider web. As the universe expanded and cooled, gravity and

Annex 23c

23


Space Video Collection


Space Image Gallery Collection

quintessence were locked in an arm wrestle for dominance over space. Both fields weakened with the universes expansion. But ultimately quintessence won out over gravity and took control to push galaxies apart.

Laissez-faire astrophysics

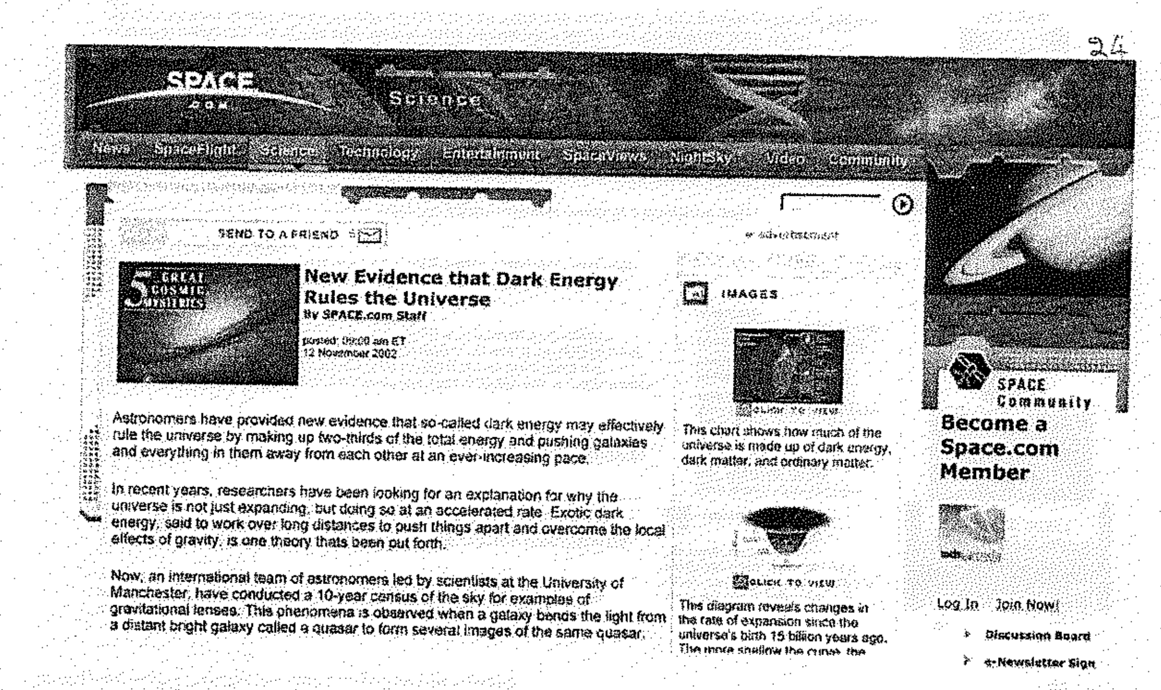
Other astronomers simply say, "Why worry?" Dark energy is just a basic feature of the universe. Trying to explain it is as pointless as trying to explain why Earth was the right distance from the Sun for life to develop. It just turned out that way; if it didnt we wouldnt be here to ask the question.

Historically, successful scientific theories are assembled from the simplest ideas. In the case of dark energy the simpler explanation is that dark matter -- as-yet-unidentified particles that comprise the bulk of the universe's mass -- and dark energy are really manifestations of a new theory of gravity. Maybe gravity weakens over time. Or, maybe the gravitational force leaks into unknown dimensions of the universe, mimicking the effects of eerie "dark stuff" in space.

Astronomers plan to look at more distant supernovae to precisely track how the universes expansion rate has changed, and this hopefully will narrow the dark energy alternatives.

"The dark energy mystery may be answered only by precision astronomical observations and not in the physics lab," says Turner. "One of our goals is to test for dark energy and see if this is preposterous because we are just dead wrong, or find out that we really do live in a preposterous universe."

Annex 24



24

SEND TO A FRIEND

New Evidence that Dark Energy Rules the Universe

By SPACE.com Staff

posted: 09:00 am ET
12 November 2002

Astronomers have provided new evidence that so-called dark energy may effectively rule the universe by making up two-thirds of the total energy and pushing galaxies and everything in them away from each other at an ever-increasing pace.

In recent years, researchers have been looking for an explanation for why the universe is not just expanding, but doing so at an accelerated rate. Exotic dark energy, said to work over long distances to push things apart and overcome the local effects of gravity, is one theory thats been put forth.

Now, an international team of astronomers led by scientists at the University of Manchester, have conducted a 10-year census of the sky for examples of gravitational lenses. This phenomena is observed when a galaxy bends the light from a distant bright galaxy called a quasar to form several images of the same quasar.

IMAGES

CLICK TO VIEW

This chart shows how much of the universe is made up of dark energy, dark matter, and ordinary matter.

CLICK TO VIEW

This diagram reveals changes in the rate of expansion since the universe's birth 15 billion years ago. The more shallow the curve, the

SPACE Community

Become a Space.com Member

Log In Join Now!

- Discussion Board
- e-Newsletter Sign

Annex 24a

By linking the number of lenses discovered with the latest information on the numbers of galaxies, the scientists have posited that most of the energy in the Universe is likely to be in an invisible, and presently unknown, form.

Dark Energy only affects the properties of the Universe over very large Distances, astronomers say. As a result, the observations sensitive to its presence, in particular studies of exploding stars in distant galaxies, are all close to the limit of current capabilities.

"The new gravitational lens test is based on completely different physical arguments to the previous ones and so provides independent evidence in support of dark energy," said Ian Browne, one of the study team members.

When a quasar is gravitationally lensed by an intervening galaxy two or more images of the quasar are produced, but they are hard to recognize as the images are extremely close together. The team therefore employed several of the world's most powerful radio telescope arrays to make radio pictures of thousands of distant quasars.

"We chose to use radio telescopes for our survey since they can pick out details many times finer than optical ones, even the Hubble Space Telescope," said Peter Wilkinson, also on the team.

faster the rate of expansion. The curve changes noticeably about 7.5 billion years ago, when objects in the universe beg

MORE STORIES

- **Dark Energy: Astronomers Still 'Clueless' About Mystery Force Pushing Galaxies Apart**
- **Dark Matter: Hidden Mass Confounds Science, Inspires Revolutionary Theories**
- **Rivers of Hot Gas Could Harbor Dark Matter**
- **Scientists Doubt Claims of Invisible 'Mirror' Comets and Asteroids**

The census showed that about one out of every 700 distant quasars is lensed by a foreground galaxy

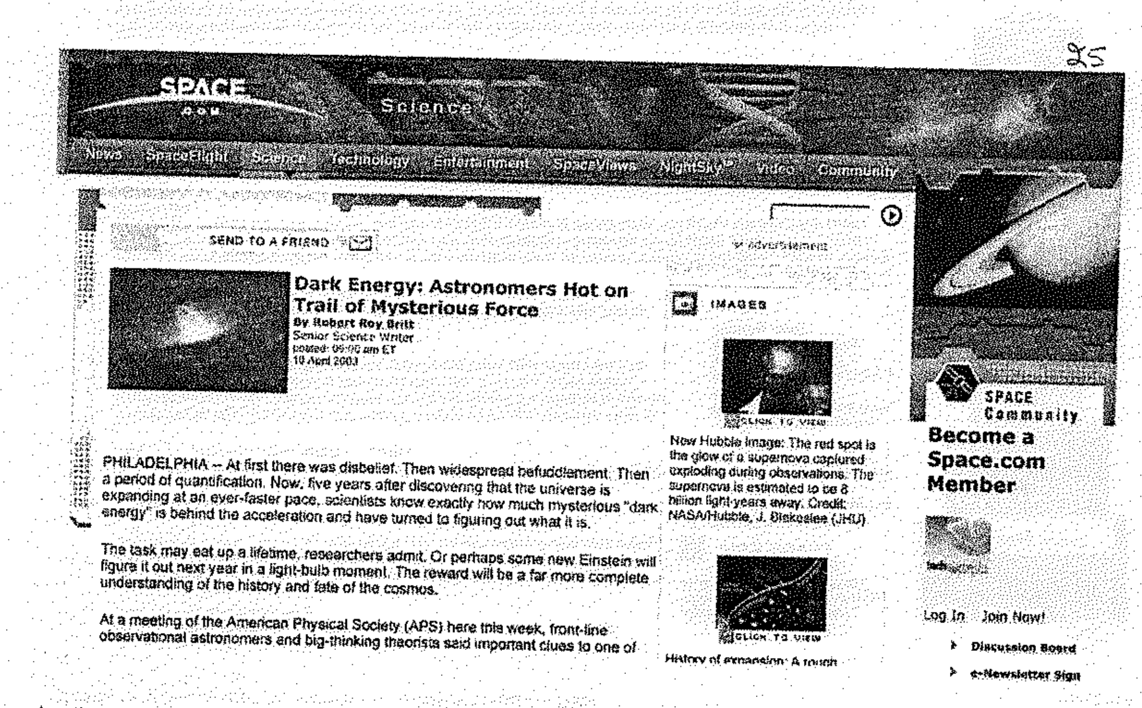
To calculate the fraction of the energy in the universe that is dark energy, Manchester's Kyu-Hyun Chae combined the gravitational lens statistics with the latest results on the numbers and types of galaxies in the universe made with optical telescopes. The result suggest that around two-thirds of the universe's energy is dark energy.

The remaining third is made up of dark matter, whose form is presently unknown, and "ordinary" matter which makes up the stars and planets. For both of these forms of matter gravity acts as normal and attracts.

In contrast dark energy has long-range anti-gravity properties and now appears to be causing the expansion of the universe to accelerate, rather than slow down as would be expected if gravity was the dominant force. While astronomers have no idea about what dark energy might be, these new results add to their growing confidence that it is real.

The Lowdown on Dark Energy

Annex 25



Dark Energy: Astronomers Hot on Trail of Mysterious Force

By Robert Roy Britt
Senior Science Writer
posted: 06:00 am ET
10 April 2003

New Hubble image: The red spot is the glow of a supernova captured exploding during observations. The supernova is estimated to be 8 billion light-years away. Credit: NASA/Hubble, J. Blakeslee (JHU)

PHILADELPHIA -- At first there was disbelief. Then widespread befuddlement. Then a period of quantification. Now, five years after discovering that the universe is expanding at an ever-faster pace, scientists know exactly how much mysterious "dark energy" is behind the acceleration and have turned to figuring out what it is.

The task may eat up a lifetime, researchers admit. Or perhaps some new Einstein will figure it out next year in a light-bulb moment. The reward will be a far more complete understanding of the history and fate of the cosmos.

At a meeting of the American Physical Society (APS) here this week, front-line observational astronomers and big-thinking theorists said important clues to one of

History of expansion: A rough

Annex 25a

the most vexing mysteries of modern science are already rolling in. Cautious optimism infused the gathering.

Much important but unpublished data are already collected, *SPACE.com* has learned, and by the end of this year the history of the universe's expansion could become a bit clearer, further illuminating the path toward understanding dark energy.

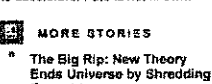
Change of pace

Our universe has always been expanding, with practically all galaxies receding from each other, except for those bound in clusters.

The expansion was decelerating until about 6.3 billion years ago, however. Then an important switch to acceleration occurred. Something caused the universe to step on the gas, driving a growth that now speeds up each day. It is like a rocket whose speed increases 100 mph in the first mile, then by the same amount the next half-mile, then in a quarter-mile, and so on.

Scientists admit they've made almost zero progress in understanding dark energy. They have no idea what it is or how it works.

picture of how the universe's expansion decelerated, then began to accelerate. Fate is not known.



MORE STORIES

- The Big Rip: New Theory Ends Universe by Shredding Everything
- Strings Attached: New Study Puts Limits on Physics of Extra Dimensions
- 'Astounding' Findings Pin Down Age of Universe, Birth of First Stars
- Dark Energy: Astronomers Still 'Clueless' About Mystery Force Pushing Galaxies Apart

Various researchers describe the phenomenon as a repulsive force, as vacuum energy, as anti-gravity, and as possibly no more than a different manifestation of gravity over large distances. Some say the repulsion could be a response to dark matter, unseen stuff that is known to make up nearly a quarter of the universe, but such a link has never been established.

All that's clear is that dark energy comprises 73 percent of the mass-energy budget of the universe, and that it is no longer an arguable point for theorists but instead is a viable quarry for astronomers.

Surprise finding

While not even trying, the Hubble Space Telescope just spotted two very distant exploding stars that represent baby steps ahead of a footrace of expected observations.

The so-called supernovae, announced this morning, are 5 billion and 8 billion light-years away and were found serendipitously by Hubble's new Advance Camera for Surveys, installed a year ago, while it was making a calibration run. Hubble officials, who have been saying the new camera would turn Hubble into a supernova hunting machine, offered the discoveries as proof of that claim.

Annex 25b

The supernovae bracket the presumed time of the switch from deceleration to acceleration, and examination of them has helped build the observational case that the shift occurred. Two other groups have used Hubble to purposely collect data on several more supernovae and results will likely be reported by the end of the year, researchers told *SPACE.com*.

Hubble is but one tool being used to probe dark energy.

Scientists are also exploring so-called cosmic microwave background radiation that carries an imprint of the baby universe's structure. Just two months ago, that effort led to the first firm determination of the age of the universe, a solid estimate for when the first stars were born, plus undisputed confirmation of dark energy's expansive role.

Other teams are examining the structure of the space through time by noting how interstellar hydrogen absorbs light. Still other researchers are pushing back the frontier of time, finding galaxies that formed when the universe was less than 10 percent its present age.

For the first time in history, experts suggest, cosmological data is accumulating faster than the wild theories that try to describe it all.

"By far the best is yet to come," said Max Tegmark, a cosmologist at the University of Pennsylvania. "We're not even halfway through this avalanche of data in cosmology."

Going back in time

Theorists have known since the 1920s that the universe was expanding. They wondered if that expansion would go on forever, or if common gravity might eventually win out and pull everything back together in a sort of Big Crunch.

Then in 1998 two separate groups hunting faraway supernovae found several that were dimmer than they should have been, indicating that the universe is not just expanding, but accelerating.

The supernovae are of a particular variety, known as Type IA, that all shine with the same intrinsic brightness. Astronomers use them as "standard candles," their observed brightness revealing their distance. Light from the objects is analyzed to determine how much the waves have stretched, which bears an exact relationship to how much the universe has expanded since the light left its source -- the exploded star.

The 1998 finding of an accelerating universe was initially met with disbelief by its discoverers. Once digested -- in some cases only in the last couple of years by skeptics -- its profound implications for the composition and fate of the cosmos brought the term dark energy into common use.

Meanwhile, theorists had already figured out that an accelerating universe would necessarily be preceded by a period of deceleration, which would have followed an initial phase of rapid inflation associated with the Big Bang.

Annex 25c



Space Video Collection



Space Image Gallery Collection

Here is why things must have slowed down:

"Early on the universe had lots of mass in a small volume," explains John Blakeslee of Johns Hopkins University. "The pull from gravity must have been enormous." As the universe expanded, gravity would have become less effective over the larger distances, and dark energy would have taken over.

One previously detected supernova, at about 10 billion light years away, supported this idea when reported in 2001, but the object proved difficult to study. The Hubble observations presented today also support the switch, said Blakeslee, lead author of a paper on the findings that will be published in the June *Astrophysical Journal*.

Had the universe always been accelerating, the supernova that's 8 billion light-years distant would have been dimmer, Blakeslee said in a telephone interview.

"It's not conclusive at all," Blakeslee said of his work. Another 20 or so very distant supernova are needed to make a strong case, he added.

Those 20, and then some, will not take long.

Hubble's new eyesight "should allow astronomers to discover roughly 10 times as many of these cosmic beacons as was possible with Hubble's previous main imaging camera," Blakeslee said.

Already in the bag

A separate Hubble project, led by Adam Riess of the Space Telescope Science Institute, has already bagged several distant supernovae. Riess, who worked on one team that made the 1998 acceleration breakthrough, reported preliminary results of his latest work at the APS meeting and is expected to publish a paper soon, possibly later this year.

Eleven other distant supernovae have been examined by Hubble in another study headed up by Saul Perlmutter of the Lawrence Berkeley National Laboratory. Perlmutter led the other team involved in the 1998 discovery of acceleration.

Perlmutter was not involved in the two new Hubble discoveries, but he told *SPACE.com* they are among many important steps that could lead to a firm determination of when acceleration began. Many of the discoveries are coming from ground-based telescopes, he noted, but Hubble "is really becoming a key for everybody in terms of follow-up" to glean the necessary detail.

By building a strong historical timeline of the universe, astronomers and cosmologists hope to answer a pressing question: Do the properties of dark energy change over time?

Annex 25d

25

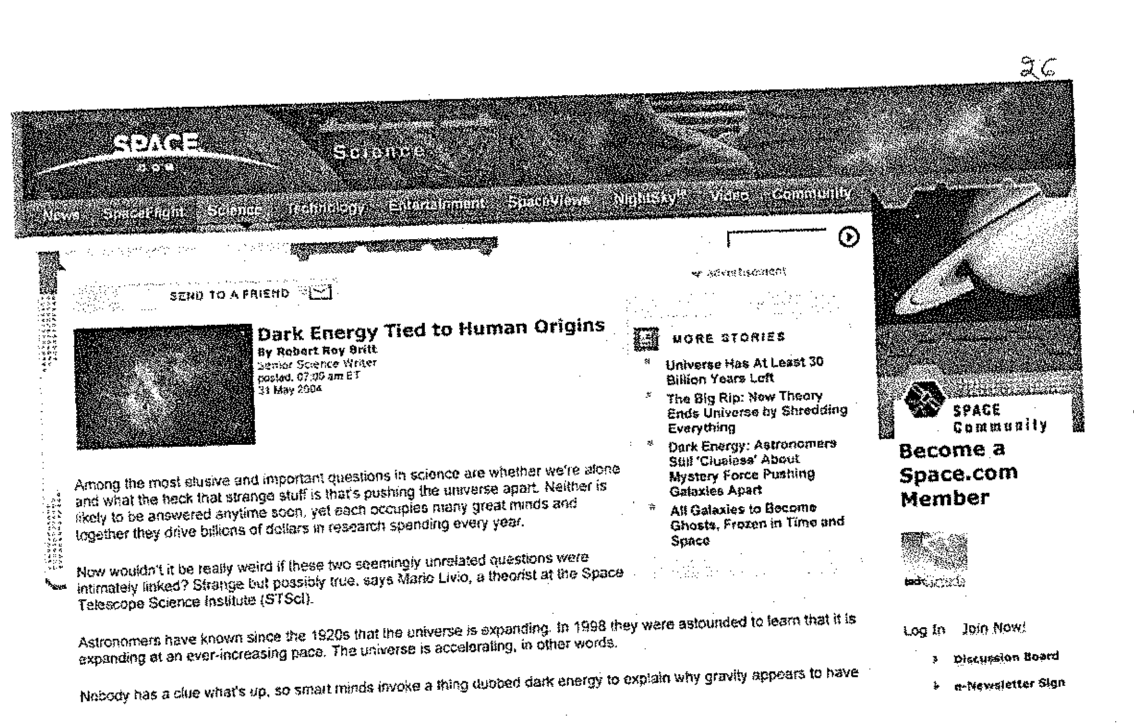
The answer would help them determine what dark energy is and would allow refined predictions about the origin and fate of the universe. No one expects a quick resolution, however.

Michael Turner, one of the world's foremost cosmologists from the University of Chicago, said solving the dark energy problem "is going to require a crazy idea." While most leading theories project the universe will accelerate forever, perhaps even to the wild point that it rips all matter apart, the notion that it might eventually collapse has not been ruled out, Turner said at the APS meeting.

"The destiny question is wide open," Turner said.

- All About Dark Energy
- Space Myths, Mysteries & Hoaxes
- Astronotes

Annex 26



SPACE.com -- Dark Energy Tied to Human Origins

Page 1 of 6

26

SEND TO A FRIEND

Dark Energy Tied to Human Origins

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
31 May 2004

Among the most elusive and important questions in science are whether we're alone and what the heck that strange stuff is that's pushing the universe apart. Neither is likely to be answered anytime soon, yet each occupies many great minds and together they drive billions of dollars in research spending every year.

Now wouldn't it be really weird if these two seemingly unrelated questions were intimately linked? Strange but possibly true, says Mario Livio, a theorist at the Space Telescope Science Institute (STScI).

Astronomers have known since the 1920s that the universe is expanding. In 1998 they were astounded to learn that it is expanding at an ever-increasing pace. The universe is accelerating, in other words.

Nobody has a clue what's up, so smart minds invoke a thing dubbed dark energy to explain why gravity appears to have

advertisement

MORE STORIES

- Universe Has At Least 30 Billion Years Left
- The Big Rip: New Theory Ends Universe by Shredding Everything
- Dark Energy: Astronomers Still 'Clueless' About Mystery Force Pushing Galaxies Apart
- All Galaxies to Become Ghosts, Frozen in Time and Space

SPACE Community

Become a Space.com Member

Log In Join Now!

- Discussion Board
- e-Newsletter Sign

...space.com/scienceastronomy/mystery_monday_040531.html

26/05/31

Annex 26a

turned into a repulsive force. They say this dark energy makes up 73 to 75 percent of the mass-energy budget of the cosmos.

"It's the equivalent of us not knowing what water is," as Livio puts it, "even though it covers 70 percent of the Earth."

Fundamentally accidental

One of astronomers' first tasks in this investigation is to determine whether dark energy's repulsive strength changes over time or not. They're working on it. By using the Hubble Space Telescope to discover distant exploding stars whose light is stretched during travel through time and space, researchers can see what the rate of expansion was when the light left each object.

If dark energy's repulsive force decreases in strength with time, the universe might eventually reverse course and collapse. If dark energy gets stronger, things could get way out of hand in the other direction, with all matter -- stars, planets, living things and atoms -- being shredded in a Big Rip.

Preliminary results show things accelerating at a manageable pace for billions of years to come.

Meanwhile, scientists are pretty sure that, whatever it is, dark energy does indeed makes up 73 percent of everything. It's tempting to call that a fundamental quantity of Nature. Livio resists that temptation.

"The values of some constants of Nature may not be fundamental, but rather accidental," he told a group of reporters who gathered at the STScI in Baltimore earlier this month to hear what projects Hubble would work on during its final years.

Livio cites the 17th Century astronomer and mathematician Johannes Kepler, who wrote an entire book to explain the fundamental reasons why there were six planets at certain distances from each other. The math was fine for its time, and Kepler can be forgiven for not knowing about the other planets yet, but it was the whole premise that was wrong.

"He misunderstood the fact that the number of planets and the sizes of their orbits were not fundamental quantities," Livio explained. "They were accidental values for the conditions that happen to be in the disk around the Sun."

Other planets around other stars, we know now, have wildly different setups.

The kicker

What's that got to do with dark energy?

Annex 26b

26

"It is very possible, though we don't know, that the very peculiar value -- 73 percent or whatever it is -- of the dark energy is in fact not a fundamental quantity," Livio said. "In order for this to happen, you must have many universes."

And, Livio and other cosmologists argue, current theories for how our universe began allow for an infinite number of what he calls "pocket universes," of which we are just one.

"The values of some things like the dark energy could be different in different pocket universes," Livio maintains. "But not all of them would allow life. If the value of dark energy in our universe were more than 10 times larger than it is, galaxies would never have formed, and we wouldn't be here to talk about it."

This article is part of SPACE.com's weekly Mystery Monday series.

- Our Mind-Boggling Universe
- Mystery Monday Archives



The Space Top 10s



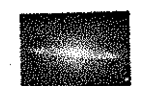
Vote for your Space Favorites



Space Trivia



Multimedia Features

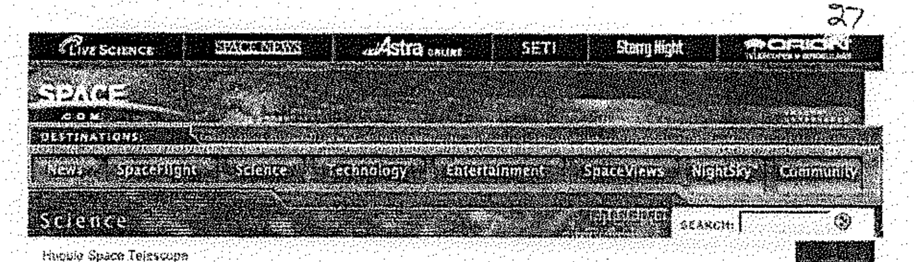


SPACE.com Reader Favorites

Space Wallpapers

Annex 27

27



Hubble Space Telescope

Rubber Band Invoked to Explain Dark Energy

By Robert Roy Britt
Senior Science Writer
posted: 29 July 2004
09:50 am ET

A new theory invokes the common rubber band in an attempt to explain dark energy, a mysterious force causing the universe to expand at an ever-increasing pace.

Scientists discovered in the late 1990s that galaxies were not just receding from each other, but doing so at an accelerating rate. Dark energy was conjured to explain the antigravity that must be at work. Nobody knows if the force is generated from within the universe or if it's an outside effect.

The new idea links dark energy to neutrinos, subatomic particles that rarely interact with other matter but which were recently found to have a minute amount of mass. Neutrinos are generated in the Sun and other stars and were also a product of the Big Bang. They pass through your house, your body and even the

advertisement

Images

More Stories

- Dark Energy Tied to Human Origins
- Universe Has At Least 30 Billion Years Left
- Physicists Solve 30-Year-Old Neutrino Case

Annex 27a

27

- Dark Energy: Astronomers Still 'Clueless' About Mystery Force Pushing Galaxies Apart

Earth constantly.

Conventional theory holds that neutrino mass does not change over time. In the new theory, neutrinos gain mass when given some room.

Tension

In the early universe, neutrinos would have been packed relatively tightly. Nowadays they are farther apart and so each has greater mass, the new theory suggests. As they move apart, a tension develops between them, like that in a stretched rubber band, said Ann Nelson, a physics professor at the University of Washington.

The increasing tension is the infamous dark energy, explained Neal Weiner, a physicist at the university and another member of the study team.

The tension has been given a name: the acceleron.

Neutrinos create an acceleron field, much like a charged particle creates an electric field, Weiner explained in a telephone interview, except that this force is always attractive.

"This attractive force is the rubber band between the neutrinos," he said. "The neutrinos leftover from the Big Bang create an acceleron field evenly throughout the universe. The energy in that field feeds the expansion of the universe."

Why is the acceleron -- for now just a theoretical thing -- theoretically useful?

Einstein's theory of General Relativity predicts that the energy density of the universe is directly related to the expansion rate. As the universe expands, the energy density gets lower, and the universe should slow down. Since the expansion is accelerating, however, some other form of energy density must be at work.

Here's the key prediction of the new theory:

"Neutrinos respond to being around other neutrinos by being lighter," Weiner said. "As you separate them, they can get heavier. As the universe expands, neutrino masses go up."

The theory also predicts that neutrinos will change mass based on how densely they're surrounded by ordinary matter, just as light looks different when passing through air versus water or through a prism. Neutrinos should have a different mass in air than when passing through rock, for example. And that might one day be measurable, using huge particle-accelerator labs, nuclear reactors or even neutrinos from the Sun.

Annex 27b

27

Accelerons are as plausible as "any other idea out there," said Robert Scherrer, a professor of physics at Vanderbilt University who recently proposed that dark energy was intimately tied to dark matter, another great mystery. (Dark matter was invoked to explain why the stars of an individual galaxy hold together in a swirl, rather than flying apart as would be dictated by the total amount of regular matter found.)

"This is a very difficult problem and we don't really have one obvious solution that is so compelling that everyone says, 'Yes, this has to be the right solution,'" Scherrer told *SPACE.com*. "That's why so many different theories are proliferating. This model will join the competition along with all the others, and some day we'll know who came up with the right answer."

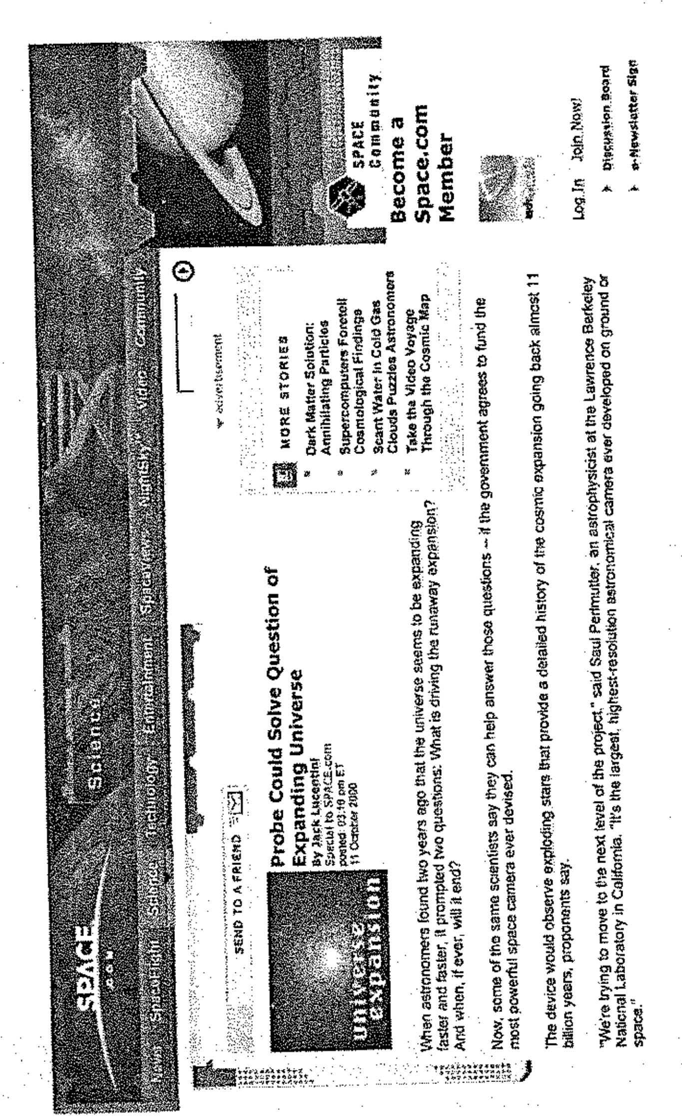
The acceleron theory will be published in an upcoming issue of *Physical Review Letters*, a journal of the American Physical Society. David B. Kaplan, a physics professor at the University of Washington, also worked on the study.

One interesting aspect is what it would mean for the fate of the universe. Observations of the effects of dark energy have yet to show whether the universe will reverse course and collapse, or expand forever to create a ghostly loneliness, or perhaps accelerate to the point that all matter is destroyed in a Big Rip.

"In our theory, eventually the neutrinos would get too far apart and become too massive to be influenced by the effect of dark energy any more, so the acceleration of the expansion would have to stop," Nelson said. "The universe could continue to expand, but at an ever-decreasing rate."

- Dark Energy's Effects

Annex 28



SPACE.com — Probe Could Solve Question of Expanding Universe

Page 1 of 8

28

SEND TO A FRIEND

Probe Could Solve Question of Expanding Universe

By Jack Lucentini
Special to SPACE.com
posted: 03:10 pm ET
11 October 2000

When astronomers found two years ago that the universe seems to be expanding faster and faster, it prompted two questions: What is driving the runaway expansion? And when, if ever, will it end?

Now, some of the same scientists say they can help answer those questions -- if the government agrees to fund the most powerful space camera ever devised.

The device would observe exploding stars that provide a detailed history of the cosmic expansion going back almost 11 billion years, proponents say.

"We're trying to move to the next level of the project," said Saul Perlmutter, an astrophysicist at the Lawrence Berkeley National Laboratory in California. "It's the largest, highest-resolution astronomical camera ever developed on ground or space."

advertisement

MORE STORIES

- Dark Matter Solution: Annihilating Particles
- Supercomputers Foretell Cosmological Findings
- Scant Water in Cold Gas Clouds Puzzles Astronomers
- Take the Video Voyage Through the Cosmic Map

SPACE Community

Become a Space.com Member

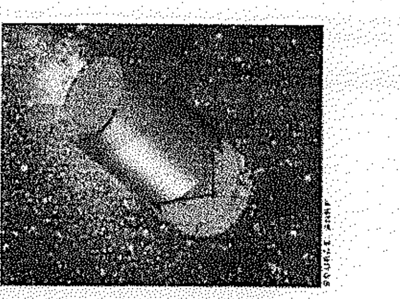
Log In Join Now!

- Discussion Board
- e-Newsletter Sign

001011.html

27/05/31

Annex 28a



An artist's rendition of the proposed SNAP satellite

If the effort succeeds, it may help forecast the fate of the universe by pointing to a front-runner among theories that explain the accelerating growth.

One such theory predicts the cosmos will end up as a vast wasteland of dead stars and finished life, never to begin anew. Others suggest that the same energy driving the growth may eventually form fresh galaxies and stars.

But some astronomers doubt the camera project will work, saying it can't find data to clearly support one explanation over the others.

'Smeared' data?

The proposal involves a satellite, called the Supernova Acceleration Probe (SNAP), costing probably more than $200 million. Scientists at UC Berkeley and a dozen other institutions are asking the Department of Energy and National Science Foundation for funding.

One group of skeptics wrote in a paper in the journal *Astrophysics* last July that this type of project will reveal "no useful information" about the universe's fate.

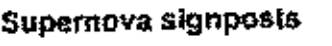
The researchers, from Princeton University and Ben-Gurion University in Israel, argued that the results depend on equations that "smear" the data. These multiply measurement errors as small as 1 percent into uncertainties of as much as 40 percent, they said.

Annex 28b

28

Proponents, in contrast, claim the device can measure several key cosmic numbers, such as the total density of energy in the universe, to an accuracy of a few percent.

"This is one of the few instruments we know of where we can spot-check all the major sources of error," said Perlmutter.

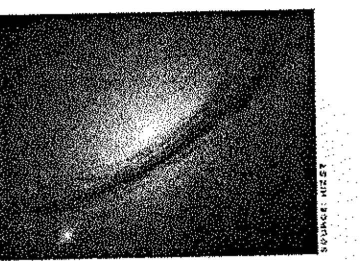


Perlmutter led one of two competing teams that rocked the scientific community in 1998 when they announced that the cosmic expansion seems to be speeding up. Scientists on both teams say they may drop their rivalry to collaborate on SNAP.

Supernova signposts

The probe would orbit Earth for three years, imaging 6,000 supernovae -- many at distances far beyond those visible today -- to glean data on the cosmic expansion.

The device would dovetail with several other planned telescope and satellite projects aimed at probing the farthest reaches of the universe. But SNAP is the only one devoted completely to studying the expansion.



A supernova of the type used to measure cosmic distances, photographed in 1994. These "Type 1a" supernovae are believed to erupt when a compact, dead star (known as a white dwarf) sucks in matter from a neighboring star. When the total mass of the white dwarf hits a certain limit, it blows to pieces.

SNAP would study a particular type of supernova thought to serve as a milepost for cosmic distances. The belief that the universe is expanding ever-faster rests on measurements of several dozen of these explosions in the 1990s.



The Space Top 10s



Vote for your Space Favorites



Space Trivia

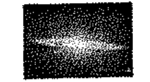


Multimedia Features



SPACE.com Reader Favorites





Space Wallpapers

Annex 28c

28

Astronomers had known for decades that the universe is expanding, since virtually every galaxy appeared to be flying apart.

But the new discovery came when astronomers noticed that galaxies birthed billions of years ago were moving away more slowly -- judging from the supernovae they contained. This acceleration differential between older and newer galaxies indicated the universe is expanding at an ever-increasing speed.

All supernovae of this type have the same intrinsic brightness, so astronomers can calculate their distance by measuring how much the intervening space has dimmed their light before it reaches Earth.

Knowing that distance and the speed of light, astronomers can also tell how long ago the flash appeared. And clocking the speed is a simple matter of measuring how much the light waves have been stretched by space as it balloons outward.

Space Video Collection



Space Image Gallery Collection

The end, or a quintessential beginning

Once the apparent cosmic acceleration was announced, scientists proposed several explanations. One was that the measurements were simply wrong. Others involve a mysterious "dark energy" pushing the universe apart. SNAP is billed as the best available test of which theory is right.

The dark energy theory comes in various breeds.

One version, the "cosmological constant," says empty space has an unchanging energy that makes it swell. As it grows, more of the energy appears, propelling the growth more rapidly. Space expands forever; meanwhile the stars finish out their life cycles, biological life dies out and nothing ever replaces it.

Fortunately, there are some mathematical and physical problems with this theory. It also requires an odd coincidence to have happened -- that is, the acceleration started right about the time humans came along to view and measure it. Before then, the universe would have been compact enough so that matter's gravity would hold back the expansion.

Another group of explanations claim that the dark energy is something called "quintessence," with its strength changing over time. According to this account, the dark energy may end up decaying into regular matter, producing new stars and galaxies.

Support for string theory

This type of view fits into "string theories," which postulate a universe peppered with extra dimensions and treat elementary particles as one-dimensional, thread-like objects.

Annex 28d

28

The data so far suggest "we're sort of perched on the edge of this much more crazy world" of mysterious extra dimensions and forces, said Andreas Albrecht, a physics professor at UC Davis.

"There are probably ways we could dig deeper. Maybe the accelerating universe is the first big example of that."

SNAP proponents say the device is custom-designed to test the different theories of the acceleration because each predicts a different ratio between the dark energy's pressure and density. The proposed satellite can accurately measure this number, its advocates say.

'I couldn't choose a better time'

Even some physicists who question the more extravagant claims for SNAP say it can produce interesting data.

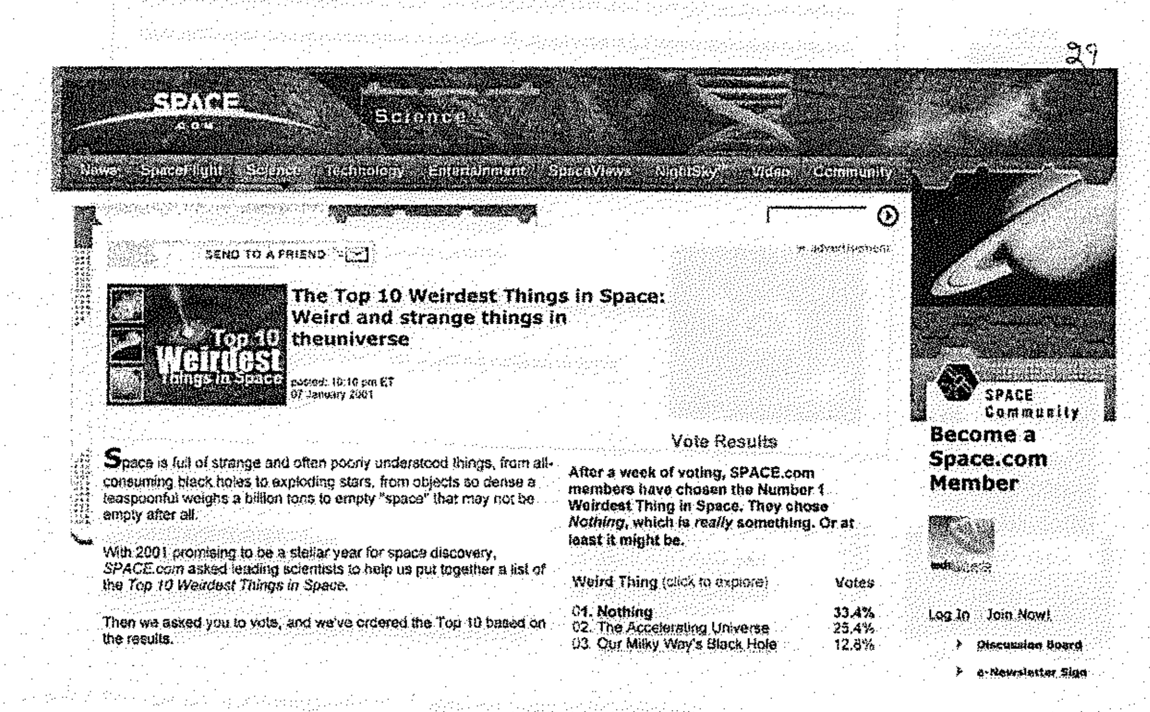
The satellite will probably only be able to tell whether the cosmological constant exists, without discriminating much among the many competing theories, Albrecht said.

But this would add to a growing trickle of information from other projects that will unlock some of the deepest secrets of the cosmos, he added. These include planned satellites to record the background radiation bathing the universe, radiation that can be affected by different types of cosmic expansion.

"You don't get to choose what period in history you're doing science," Albrecht said. "But if I had to choose, I couldn't choose a better time."

Annex 29

SPACE.com -- The Top 10 Weirdest Things in Space: Weird and strange things in theuniverse Page 1 of 6



SEND TO A FRIEND

The Top 10 Weirdest Things in Space: Weird and strange things in theuniverse

posted: 10:10 pm ET
07 January 2001

Space is full of strange and often poorly understood things, from all-consuming black holes to exploding stars, from objects so dense a teaspoonful weighs a billion tons to empty "space" that may not be empty after all.

With 2001 promising to be a stellar year for space discovery, *SPACE.com* asked leading scientists to help us put together a list of the *Top 10 Weirdest Things in Space*.

Then we asked you to vote, and we've ordered the Top 10 based on the results.

Vote Results

After a week of voting, SPACE.com members have chosen the Number 1 Weirdest Thing in Space. They chose *Nothing*, which is *really* something. Or at least it might be.

Weird Thing (click to explore)	Votes
01. **Nothing**	33.4%
02. The Accelerating Universe	25.4%
03. Our Milky Way's Black Hole	12.8%

http://www.space.com/scienceastronomy/top_10_weird.html 26/05/31

Annex 29a

Some of these objects and phenomena are pretty well understood. Others are complete mysteries. All of them remind us of the strange wonder of the cosmos.



04. Hypernovae	6.4%
05. Asteroid Companions	4.9%
06. The Sun's Hot Atmosphere	4.4%
07. Electrostatic Levitation	3.4%
08. High-Energy Cosmic Rays	3.3%
09. Neutron Stars	3.3%
10. Brown Dwarfs	2.6%

Agree with the list? No?
Uplink your views!

About this project



The *Top 10 Weirdest Things in Space* was written and produced by Senior Science Writer Robert Roy Britt.

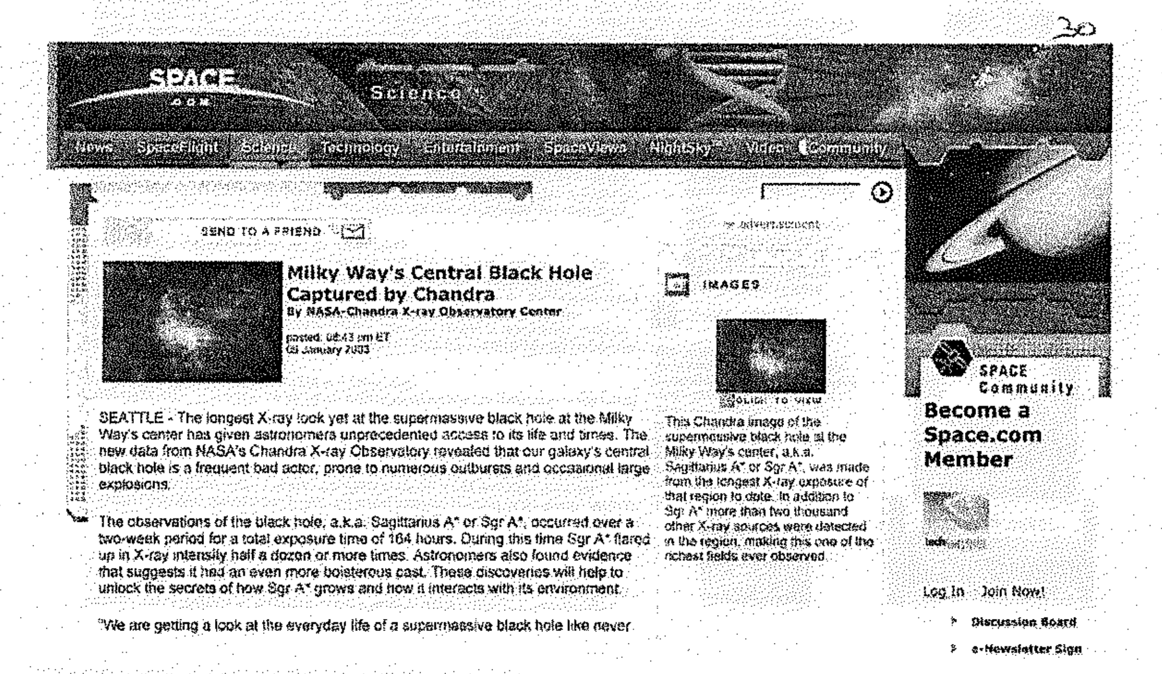
A special thanks goes out to the scientists who helped develop the list, and who provided insight into some of the weirdest things in space:

- **Morris Aizenman**, National Science Foundation
- **William Merline**, Southwest Research Institute
- **Matthew Genge**, London Natural History Museum
- **James C. White II**, Astronomical Society of the Pacific
- **Markus Aschwanden**, Lockheed Martin Solar and Astrophysics Laboratory
- **Niel Brandt**, Penn State
- **Tom Geballe**, Gemini Observatory

Other researchers unwittingly contributed to the project by making some of the coolest discoveries of last year.

This project originally appeared Jan. 2, 2000. The Top 10 list was re-ordered, based on SPACE.com member votes through Noon ET on Sunday, Jan. 7.

Annex 30



SPACE.com — Milky Way's Central Black Hole Captured by Chandra

Page 1 of 5

SEND TO A FRIEND

Milky Way's Central Black Hole Captured by Chandra

By NASA-Chandra X-ray Observatory Center

posted: 06:43 pm ET
06 January 2003

SEATTLE - The longest X-ray look yet at the supermassive black hole at the Milky Way's center has given astronomers unprecedented access to its life and times. The new data from NASA's Chandra X-ray Observatory revealed that our galaxy's central black hole is a frequent bad actor, prone to numerous outbursts and occasional large explosions.

The observations of the black hole, a.k.a. Sagittarius A* or Sgr A*, occurred over a two-week period for a total exposure time of 164 hours. During this time Sgr A* flared up in X-ray intensity half a dozen or more times. Astronomers also found evidence that suggests it had an even more boisterous past. These discoveries will help to unlock the secrets of how Sgr A* grows and how it interacts with its environment.

"We are getting a look at the everyday life of a supermassive black hole like never

advertisement

IMAGES

CLICK TO VIEW

This Chandra image of the supermassive black hole at the Milky Way's center, a.k.a. Sagittarius A* or Sgr A*, was made from the longest X-ray exposure of that region to date. In addition to Sgr A* more than two thousand other X-ray sources were detected in the region, making this one of the richest fields ever observed.

http://www.space.com/scienceastronomy/cosmic_monster_030106.html

26/05/31

Annex 30a

before," said Frederick K. Baganoff of the Massachusetts Institute of Technology in Cambridge, who presented these new results on behalf of an international team at a press conference today at the American Astronomical Society meeting in Seattle. "We see it flaring on an almost daily basis."



This annotated Chandra image marks the location of the X-ray source associated with the supermassive black hole, Sagittarius A* (Sgr A*), at the center of the Milky Way galaxy. Also marked on this image are newly discovered large lobes of multimillion-degree gas that extend for dozens of light years on either side of the black hole.

The cause of the flares is not understood, but the rapidity with which they rise and fall indicates that they are occurring near the event horizon, or point of no return, around the black hole. Even when it flares, the intensity of the X-ray emission from the vicinity of the black hole is relatively weak, which suggests that Sgr A*, weighing in at 3 million times the mass of the Sun, is a starved black hole.

"Although it appears to snack often, this black hole is definitely on a severe diet," says Baganoff. "This could be because explosive events in the past blew away much of the gas from the neighborhood of the black hole."

Indeed, evidence for such events - which astronomers are viewing 26,000 years later due to the time it takes light to travel to Earth from the center of the Galaxy - can be found in the image. A faint streak of X-rays about 1 light-year long has been discovered 1.5 light-years from Sgr A*. The streak points at Sgr A*, suggesting that it may be a jet of particles expelled at nearly the speed of light from just outside the event horizon of the black hole. The intensity and size of this jet indicate that the flaring activity has been occurring for many years.

MORE STORIES

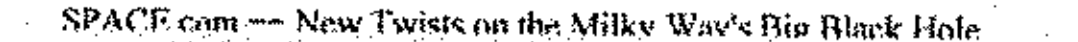
- **Puzzling Ring of Stars Discovered Circling the Milky Way**
- **Final Proof Provided for Milky Ways Central Black Hole**
- **Where The Action Is: Heart of Milky Way Unveiled**

On a much larger scale, huge lobes of 20-million-degree-Centigrade gas extending over dozens of light years on either side of the black hole have also been discovered. "These lobes show that enormous explosions have occurred several times over the last ten thousand years," said Mark Morris of UCLA, lead author of a second paper on Sgr A*, who also participated in the press conference.

Sangwook Park, of Penn State University in University Park, and Michael Muno, of MIT, were lead authors of two other papers presented at the meeting. These papers focused on the extraordinarily rich region around the central black hole, where they detected more than 2,000 X-ray sources.

NASA's Marshall Space Flight Center in Huntsville, Ala., manages the Chandra program, and TRW, Inc., Redondo Beach, Calif., is the prime contractor for the spacecraft. The Smithsonian's Chandra X-ray Center controls science and flight operations from Cambridge, Mass., for the Office of Space Science at NASA Headquarters, Washington.

Annex 31



New Twists on the Milky Way's Big Black Hole

By Robert Roy Britt
Senior Science Writer
posted: 08:00 am ET
24 November 2003

The supermassive black hole at the center of our Milky Way Galaxy is heftier than thought and rotates at an amazing clip, new research shows.

For years scientists said the black hole contained about 2.6 million times the mass of the Sun. They now believe the figure is somewhere between 3.2 million and 4 million solar masses.

And a new study suggests all that mass, confined to an area about 10 times smaller than Earth's orbit around the Sun, spins around about once every 11 minutes. The Sun, for comparison, takes about a month to make a revolution on its axis. Earth spins once every 24 hours.

IMAGES

CLICK TO VIEW

The orbit of a particle near a black hole depends on the curvature of space around the black hole, which also depends on how fast the black hole is spinning. A spinning black hole drags space around with it and allows atoms to orbit nearer to the black hole than is possible for a non-spinning black hole, as seen in the right-hand artist's rendering of a stellar black hole. In the left one, no evidence for spin was found.

MORE STORIES

Annex 31a

Black holes can't be seen or measured directly, because light passing near them gets trapped. So astronomers measure a black hole's mass by observing the orbital speed of nearby stars.

The new mass estimate was made by two separate groups, one at the University of California, Berkeley, and another at the University of California, Los Angeles. UC Berkeley physicist Reinhard Genzel told *SPACE.com*.

The True Shape of Black Holes
- Voyage into the Vortex: Survival Tips for Black Hole Travelers
- New Spin on Black Holes: Like Stars, They Rotate
- Birth of a Black Hole is Messy, New Observations Suggest

Fresh spin

More interesting, perhaps, is what appears to be a precise measurement of the supermassive black hole's spin rate made by Genzel's group.

Other studies have shown compelling evidence for the rotation of less massive black holes, formed when stars collapse. That's no surprise to astronomers, since these stellar black holes would logically retain the rotation of their progenitor stars. The first solid evidence for a spinning stellar black hole emerged more than two years ago.

Only hints of spin have been noted from supermassive black holes, each of which is thought to form and evolve hand-in-hand with the development of the galaxy in which it sits.

The location of the Milky Way's central black hole is well known. Called Sagittarius A*, or Sgr A*, it sits about 26,000 light-years away, at the heart of the galaxy. It is surrounded by intense radio waves, X-rays and other radiation. Astronomers know the black hole is smaller than the diameter of Earth's orbit; they suspect it is about 10 times smaller but have not been able to measure it with enough precision to know for sure.

Genzel's team saw a flickering of near-infrared light they presume is generated by hot gas falling into the black hole, just before the gas disappears beyond the "event horizon," a point of no return for light and matter.

"If our interpretation is right, this is the first solid evidence for a spin of a massive black hole," Genzel said in an e-mail interview.

The black hole spins once every 11 minutes or so, Genzel estimates, though an exact figure is difficult to pin down. The estimate represents a pace equal to about 30 percent of the speed of light.

The data were collected by the 8.2-meter Kueyen telescope at the European Southern Observatory in Chile and detailed in a recent issue of the journal *Nature*.

"These observations, reflecting similar patterns seen earlier in X-rays, open a new window on this enigmatic source," said Ramesh Narayan of the Harvard-Smithsonian Center for Astrophysics, in an analysis of the work for the journal.

Annex 31b

31

Theorists suspect other supermassive black holes, some containing as much matter as a billion Suns, should also spin.

Smaller scale

Not all black holes spin at the same rate, other investigations indicate. In fact, some may not spin at all.

Another recent study pinned down how X-ray emissions from fast-moving iron atoms near a stellar black hole can be used to determine whether or not the unseen central object is rotating.

The iron produces a distinct X-ray signature. The orbit of the atoms depends on the extent to which space around a black hole is curved. That mind-bending warpage, in turn, is determined by how much the black hole spins.

A spinning black hole drags space with it, allowing atoms to orbit closer to the black hole than if it were not spinning.

Observations by the European Space Agency's XMM-Newton satellite of a stellar black hole named XTE J1650-500 reveal some iron-generated X-rays just 20 miles from the event horizon. This black hole must be spinning rapidly, researchers say.

Data collected by NASA's Chandra X-ray Observatory, on a stellar black hole called Cygnus X-1, finds atoms no closer than 100 miles from the event horizon, providing no evidence that it spins.

Coming together

Meanwhile, efforts to understand whether and why lightweights and heavyweights rotate are converging.

Jon Miller, who worked on the recent stellar black hole research, said there is a high degree of correspondence between what happens to space around a spinning stellar black hole and its supermassive brethren.

"Because stellar black holes are smaller, everything happens about a million times faster, so they can be used as a test-bed for theories of how spinning black holes affect the space and matter around them," Miller said.

This article is part of SPACE.com's weekly Mystery Monday series.

- **Chandra Picture of the Milky Way's Black Hole**
- **Mystery Monday Archives**
- **Space Mailbag**



The Space Top 10s



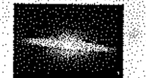
Vote for your Space Favorites



Space Trivia



Multimedia Features

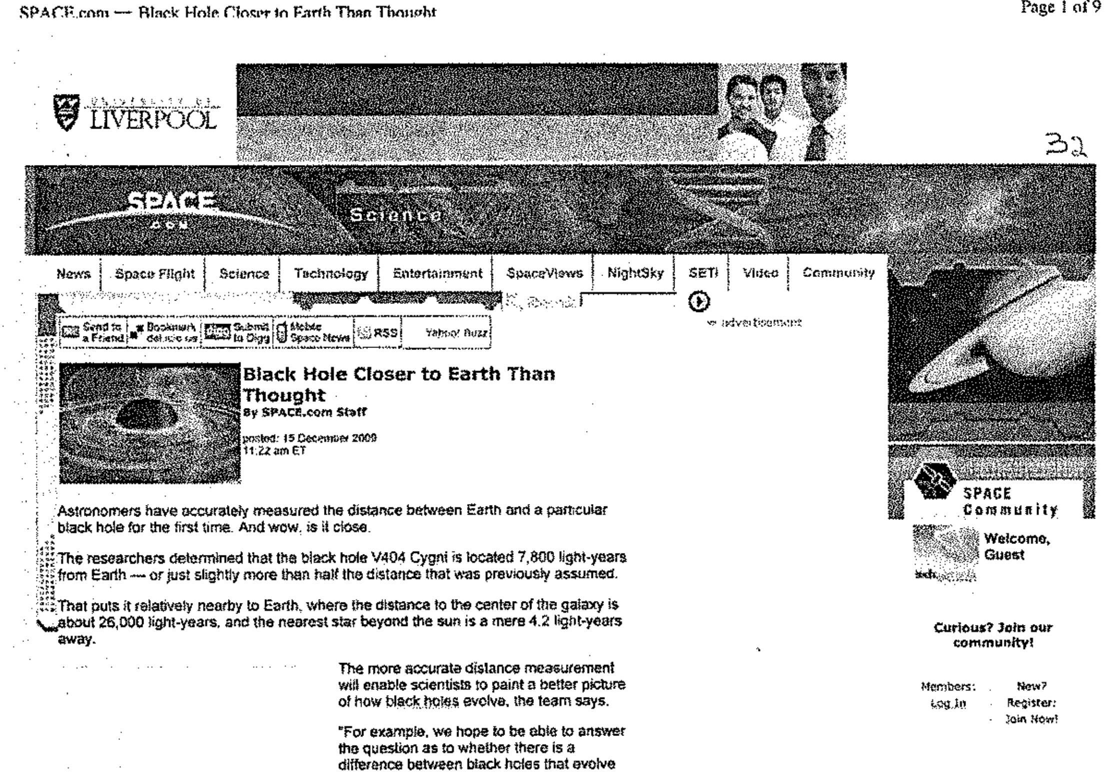


SPACE.com Reader Favorites



Space Wallpapers

Annex 32



32

SPACE.com Science

News | Space Flight | Science | Technology | Entertainment | SpaceViews | NightSky | SETI | Video | Community

Send to a Friend | Bookmark del.icio.us | Submit to Digg | Mobile Space News | RSS | Yahoo! Buzz

Black Hole Closer to Earth Than Thought

By SPACE.com Staff

posted: 15 December 2009
11:22 am ET

Astronomers have accurately measured the distance between Earth and a particular black hole for the first time. And wow, is it close.

The researchers determined that the black hole V404 Cygni is located 7,800 light-years from Earth — or just slightly more than half the distance that was previously assumed.

That puts it relatively nearby to Earth, where the distance to the center of the galaxy is about 26,000 light-years, and the nearest star beyond the sun is a mere 4.2 light-years away.

The more accurate distance measurement will enable scientists to paint a better picture of how black holes evolve, the team says.

"For example, we hope to be able to answer the question as to whether there is a difference between black holes that evolve

SPACE Community

Welcome, Guest

Curious? Join our community!

Members: Log In

New? Register: Join Now!

Annex 32a

directly from the collapse of a star without a supernova and black holes that evolve via a supernova and a temporary intermediate star," said study team member Peter Jonker of SRON Netherlands Institute for Space Research.

"We expect that the black holes in the last group can get a kick. Black holes formed in this way could then move through space faster."

Jonker and his team measured the distance to V404 Cygni by measuring radio emissions from the black hole and its associated dying star.

The outermost layers of the star are being siphoned by the black hole. The swirling gas forms a hot plasma disk around the black hole before it disappears, and the process emits a lot of X-rays and radio waves.

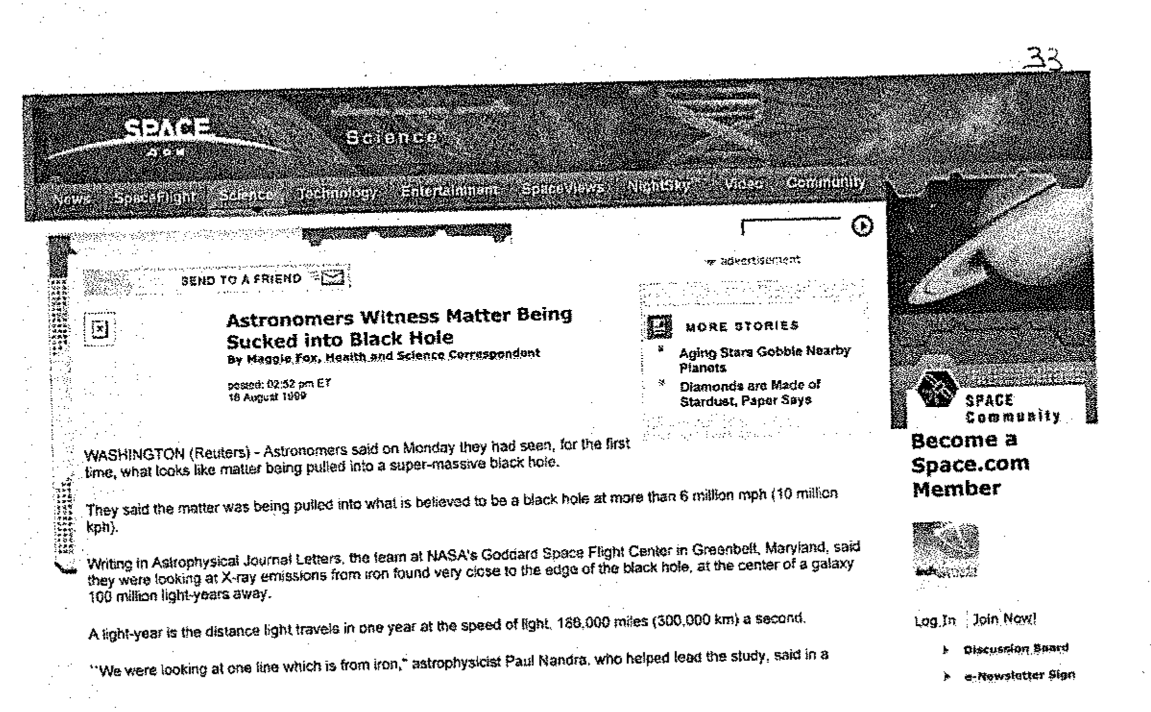
Using an international system of radio telescopes called the High Sensitivity Array, the team measured the so-called parallax shift of the black hole system. This method involves measuring the annual movement in the sky of the black hole system as a consequence of Earth's orbit around the sun.

The team says the previous overestimation of V404 Cygni's distance was due to an underestimation of the absorption and diffraction of interstellar dust, which can give an error margin of about 50 percent. The error margin of the new measurement is less than 6 percent.

The research was detailed in the Dec. 1 issue of The Astrophysical Journal.

- Top 10 Star Mysteries
- Video – Slow Birth of a Black Hole
- Top 10 Strangest Things in Space

Annex 33



SEND TO A FRIEND

Astronomers Witness Matter Being Sucked into Black Hole

By Maggie Fox, Health and Science Correspondent

posted: 02:52 pm ET
18 August 1999

MORE STORIES

- Aging Stars Gobble Nearby Planets
- Diamonds are Made of Stardust, Paper Says

WASHINGTON (Reuters) - Astronomers said on Monday they had seen, for the first time, what looks like matter being pulled into a super-massive black hole.

They said the matter was being pulled into what is believed to be a black hole at more than 6 million mph (10 million kph).

Writing in Astrophysical Journal Letters, the team at NASA's Goddard Space Flight Center in Greenbelt, Maryland, said they were looking at X-ray emissions from iron found very close to the edge of the black hole, at the center of a galaxy 100 million light-years away.

A light-year is the distance light travels in one year at the speed of light, 186,000 miles (300,000 km) a second.

"We were looking at one line which is from iron," astrophysicist Paul Nandra, who helped lead the study, said in a

Annex 33a

telephone interview.

"This line, we think, comes from very, very close to the black hole and it comes from matter that is orbiting the black hole in a disk," he said.

In a black hole, the force of gravity is so strong that nothing, not even light, can escape. Some black holes are formed by collapsed stars, but others are "supermassive," containing as much mass as a million to a billion suns compressed into a tiny region.

The only way scientists have been able to "see" them up to now is by looking at the accretion disks -- the swirling matter circling around as it is being pulled into the black hole.

As matter swirls around a black hole, it sends out all kinds of energy, which can be seen by X-ray telescopes like the one the Goddard team used. Once it gets past a certain point, known as the event horizon, it cannot be seen.

It is visible before that point. Usually, however, what astronomers have seen is matter being bounced around in the accretion disk. Until now they have not seen it on its final downward plunge into the black hole.

Nandra and colleagues think they have finally seen it.

They were looking at the galaxy NGC 3516 using the Advanced Satellite for Cosmology and Astrophysics (ASCA), a Japanese -U.S. X-ray satellite launched in 1993 to look at the superheated gas in the accretion disk.

Buried in the X-rays emitted by the gas was a strange feature -- energy that has been "red-shifted" in an astronomical Doppler effect.

Just as stretched and compressed sound waves cause the sound of a train's whistle or a truck's horn to rise and fall as they pass an observer, light is stretched, or red-shifted, as it speeds away from the Earth.

In this case, Nandra said, an analysis of this altered light indicated the iron was moving at a clip of about 6.5 million mph (10.5 million kph) toward a black hole.

"The evidence is pretty good," he said. But, he added in a telephone interview, "this is our interpretation of the data."

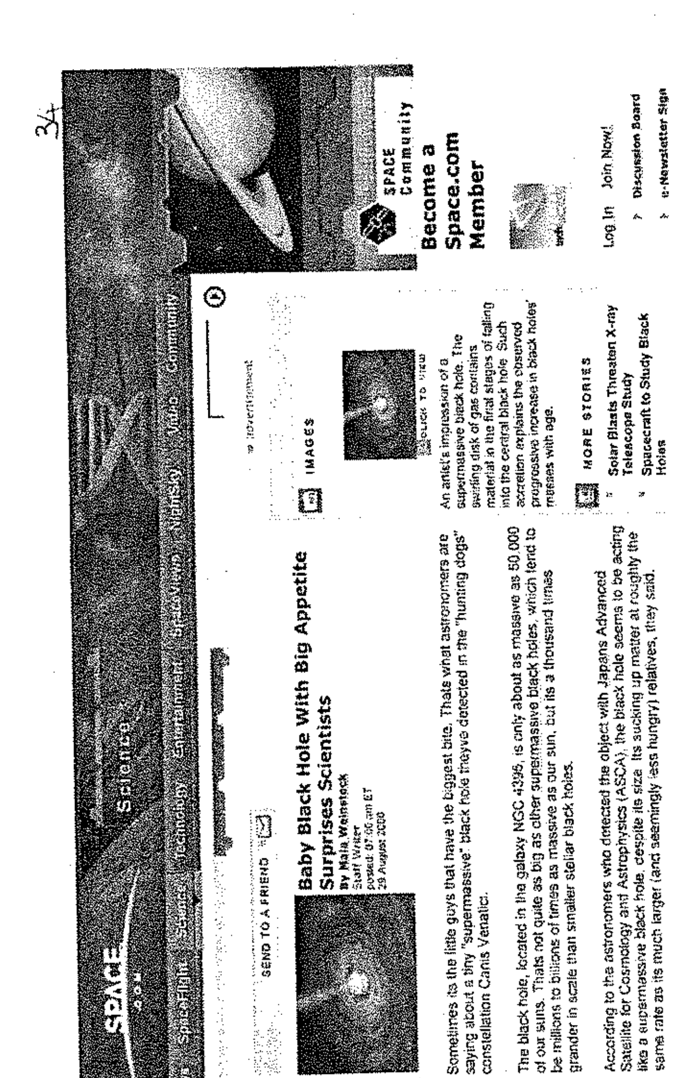
Richard Mushotzky, an astrophysicist at Goddard who worked with Nandra, said this was the first time anyone had reported seeing evidence of matter falling into a black hole.

"Nobody has ever seen direct evidence for inflow," he said.

33



Annex 34



34

SEND TO A FRIEND

Baby Black Hole With Big Appetite Surprises Scientists

By Maia Weinstock
Staff Writer
posted: 07:00 am ET
29 August 2000

Sometimes its the little guys that have the biggest bite. Thats what astronomers are saying about a tiny "supermassive" black hole theyve detected in the "hunting dogs" constellation Canis Venatici.

The black hole, located in the galaxy NGC 4395, is only about as massive as 50,000 of our suns. Thats not quite as big as other supermassive black holes, which tend to be millions to billions of times as massive as our sun, but its a thousand times grander in scale than smaller stellar black holes.

According to the astronomers who detected the object with Japans Advanced Satellite for Cosmology and Astrophysics (ASCA), the black hole seems to be acting like a supermassive black hole, despite its size. Its sucking up matter at roughly the same rate as its much larger (and seemingly less hungry) relatives, they said.

IMAGES

CLICK TO VIEW

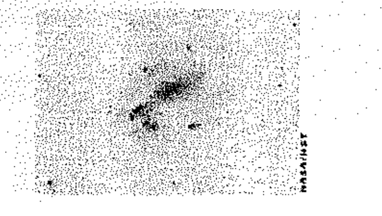
An artist's impression of a supermassive black hole. The swirling disk of gas contains material in the final stages of falling into the central black hole. Such accretion explains the observed progressive increase in black holes' masses with age.

MORE STORIES

- Solar Blasts Threaten X-ray Telescope Study
- Spacecraft to Study Black Holes

Annex 34a

"The small black hole in this galaxy is working hard to rival bigger black holes of low efficiency," said Kazushi Iwasawa, a researcher at the Institute of Astronomy in England, and one of the discoverys contributors.



Astronomers using the Advanced Satellite for Cosmology and Astrophysics found a small black hole with a large appetite in this galaxy, NGC 4395.

Black holes are regions of space so dense, not even light can escape their gravitational pull. As a black hole gobbles up gas, dust and even entire stars, the incoming matter gets so hot, it gives off high-energy radiation as it plunges into the hole. This energy includes X-rays, which are detectable by telescopes in near-Earth orbit.

Until now, scientists had speculated that black holes residing in galaxies with dim cores such as NGC 4395 were either too old or too small to quickly eat up lots of material, as more massive black holes do on a regular basis. But now it seems that "mid-mass" black holes (a *new nickname* for the smallest type of supermassive black holes) may simply be more efficient matter-eaters.

"We now see that the nuclear source in NGC 4395 is a scaled-down version of black holes found in the most luminous of galaxies," said, Andrew Fabian, another Institute of Astronomy researcher who worked on the discovery. "Everything is the same, only it is smaller."

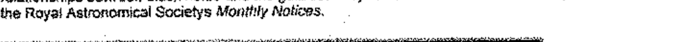
As a result, some astronomers now think that the total output of X-rays from accreting matter may therefore be more a product of how massive the black hole is, rather than of the luminosity of the region surrounding the black hole, as it once was thought.

"NGC 4395 hosts the least luminous and nearest active nucleus known," said Fabian. "This [discovery] shows that mid-mass black holes behave like their more massive and less massive cousins."

According to Iwasawa and Fabian, this new change in thinking will be extremely important for future studies of the

Annex 34b

34



relationships between black holes and the galaxies they reside in. Their results will be published in an upcoming issue of the Royal Astronomical Societys *Monthly Notices*.





The Space Top 10s



Vote for your Space Favorites



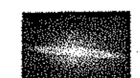
Space Trivia

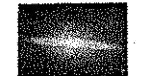


Multimedia Features



SPACE.com Reader Favorites

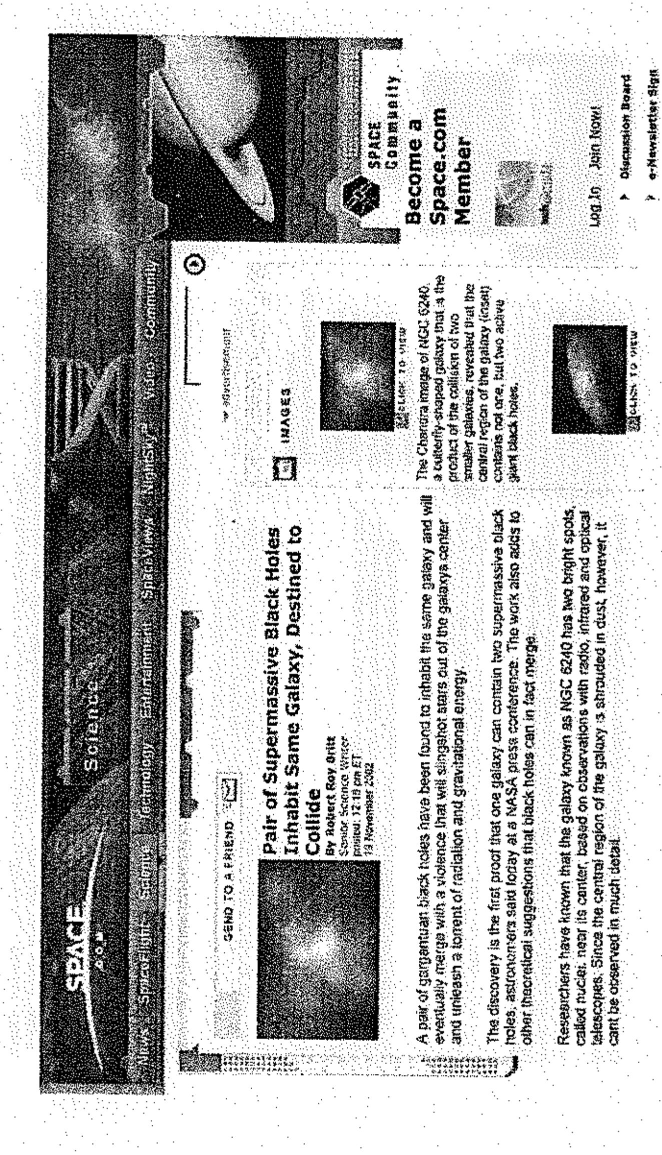




Space Wallpapers

Annex 35

35



Pair of Supermassive Black Holes Inhabit Same Galaxy, Destined to Collide

By Robert Roy Britt
Senior Science Writer
posted: 12:18 pm ET
19 November 2002

A pair of gargantuan black holes have been found to inhabit the same galaxy and will eventually merge with a violence that will slingshot stars out of the galaxys center and unleash a torrent of radiation and gravitational energy.

The discovery is the first proof that one galaxy can contain two supermassive black holes, astronomers said today at a NASA press conference. The work also adds to other theoretical suggestions that black holes can in fact merge.

Researchers have known that the galaxy known as NGC 6240 has two bright spots, called nuclei, near its center, based on observations with radio, infrared and optical telescopes. Since the central region of the galaxy is shrouded in dust, however, it cant be observed in much detail.

The Chandra image of NGC 6240, a butterfly-shaped galaxy that is the product of the collision of two smaller galaxies, revealed that the central region of the galaxy (inset) contains not one, but two active giant black holes.

Annex 35a

35

To investigate the pair, scientists pointed the Chandra X-ray Observatory at it. X-rays penetrate dust.

"With Chandra, we hoped to determine which one, if either, of the nuclei was an active supermassive black hole," said Stefanie Komossa of the Max Planck Institute for Extraterrestrial Physics. "Much to our surprise, we found that both were active black holes."

An artist's conception shows a black hole surrounded by a disk of hot gas, and a large doughnut or torus of cooler gas and dust. The light blue ring on the back of the torus is due to the fluorescence of iron atoms excited by X-rays from the hot gas disk.

MORE STORIES

- Black Hole Breakaway: Supernova Gives Birth to Cosmic Monster
- Study Supports Idea that Giant Black Holes Merge
- Cosmic Cannon: How an Exploding Star Could Fry Earth
- Closest Known Neutron Star Races Across Sky

Active black holes are those that are actively consuming matter. Astronomers detect them because some of the incoming matter is not consumed, but rather is converted to energy in a frenetic environment of high-speed travel. The stuff is shot out as X-rays, other radiation and superheated matter called plasma.

Our own Milky Way harbors a supermassive black hole weighing as much as 2.6 million Suns. It is not, however, very active. A study earlier this year suggested that black hole mergers could serve as an on-off switch for the input and output of a black hole.

The collision

The galaxy Komossa and her colleagues examined is about 400 million light-years away, close by astronomical standards in a universe that spans more than 12 billion light years. The two black holes are about 3,000 light-years apart and closing. Each used to anchor a separate galaxy, but the two galaxies begin merging about 30 million years ago, astronomers estimate.

When galaxies merge, individual stars are typically not affected, theorists believe. But with two black holes colliding, thing get a little more chaotic. *SPACE.com* asked Komossa what will happen.

For now, the two black holes do not feel each others gravity directly, Komossa explained. Stars are unaffected because they are so widely separated. But the overall centers of the two galaxies are interacting gravitationally.

As the black holes draw closer, some stars will begin to feel the effect.

"Individual stars which approach the binary black hole closely are accelerated and finally ejected from the center of the galaxy," she said. "The energy is extracted from the orbital energy of the black hole binary."

The mechanism is the same slingshot effect NASA uses to sent spacecraft around a planet, robbing a tiny bit of the planets energy to give the craft a speed boost and fling it a more distant planet.

Annex 35b

35

Making waves

When the black holes get as close as 1 light-year apart, they will begin to merge.

"They are now spiraling towards each other," Komossa said of that future event. "The final merging of the black holes, to form a single one of larger mass, will be accompanied by an enormous burst of gravitational waves."

These waves will spread through the universe, causing ripples in the fabric of space that astronomers would be able to detect as tiny changes in distance between two points.

"This is the first time that we see a binary black hole in action, the smoking gun for something which will become a major gravitational wave burst in the future," said Guenther Hasinger, another Max Planck researcher involved in the work.

Meanwhile, theres more to the merger. During the final stages, more and more gas rains down on the two black holes.

Komossa: "The gas will heat itself up in the process, and start to emit huge amounts of radiation, strongly increasing the luminosity of the nucleus of the galaxy, outshining the whole galaxy in its brightness by a large factor. The strong radiation field will start to destroy the dust in the environment of the nucleus, giving an outside observer an even clearer view on the nucleus of the galaxy.

"The powerful radiation will also hinder part of the infalling matter to actually reach the black holes horizon and disappear within the black hole; instead the material will be driven out again by strong radiation pressure, and huge outflows or jets may built up."

When all is said and done, few stars are likely to remain in the vicinity of the merged and more massive black hole.

One of many

Komossa said the new findings are indirect evidence that black holes must be in all states of merging around the universe.

She points out that NGC 6240 is relatively nearby, making the new and finely detailed observations possible. Astronomers have seen evidence for active black holes many billions of light years distant.

"The fact that we do see a binary black hole in this galaxy strongly suggests that there are many more out there," she said.

Other studies have shown that several gravitational wave event occur every year. A planned space detector called LISA


The Space Top 10s


Vote for your Space Favorites


Space Trivia


Multimedia Features


SPACE.com Reader Favorites

Space Wallpapers

Annex 35c

35

(Laser Interferometer Space Antenna) would search for them.

- **Monster Black Holes: How Galactic Collisions Fed Them**
- **If the Sun Turned into a Black Hole, Would We Notice?**
- **More Black Hole News**

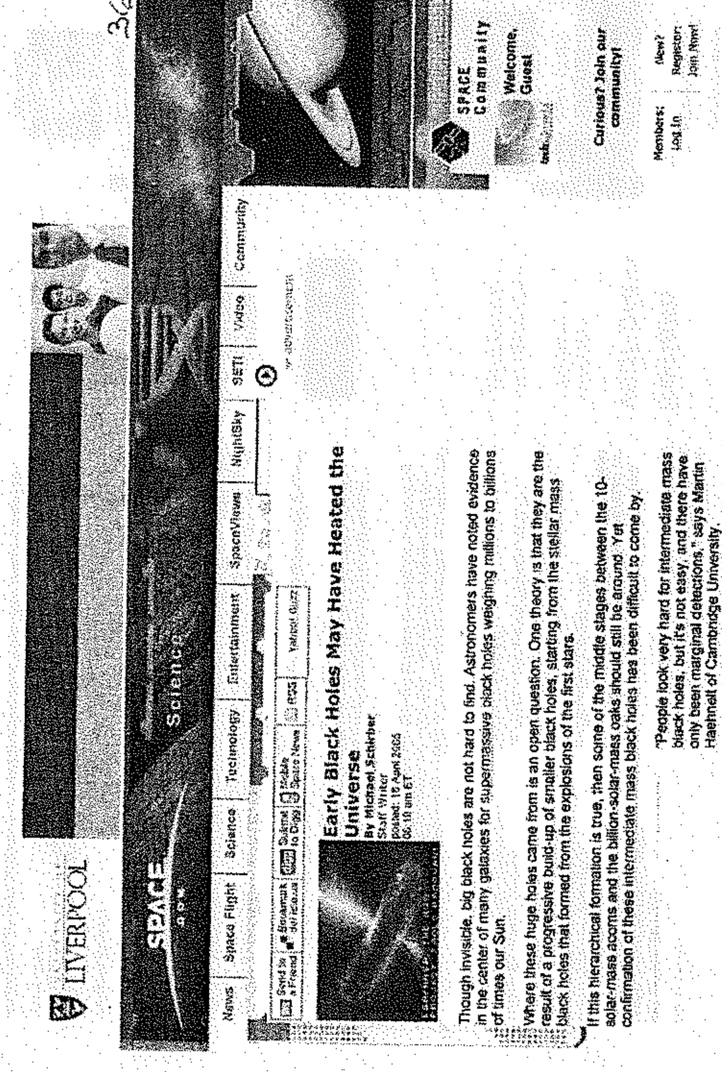


Space Video Collection



Space Image Gallery Collection

Annex 36



Early Black Holes May Have Heated the Universe

By Michael Schirber
Staff Writer
posted: 18 April 2005
06:10 am ET

Though invisible, big black holes are not hard to find. Astronomers have noted evidence in the center of many galaxies for supermassive black holes weighing millions to billions of times our Sun.

Where these huge holes came from is an open question. One theory is that they are the result of a progressive build-up of smaller black holes, starting from the stellar mass black holes that formed from the explosions of the first stars.

If this hierarchical formation is true, then some of the middle stages between the 10-solar-mass acorns and the billion-solar-mass oaks should still be around. Yet confirmation of these intermediate mass black holes has been difficult to come by.

"People look very hard for intermediate mass black holes, but it's not easy, and there have only been marginal detections," says Martin Haehnelt of Cambridge University.

Annex 36a

36

But there may be indirect evidence for these middleweight black holes in the re-warming of the early universe.

"Matter accreting around a black hole heats up," Haehnelt said, "and this heating could be a sign that small black holes were widespread in the universe at that time."

Haehnelt presented a model for these primordial heaters on April 13 at the Institute of Physics conference *Physics 2005* in Warwick, England.

Renaissance

In general, the gas in the universe has cooled over time due to expansion. But more than 13 billion years ago, the cosmos awoke out of its dark age with the emergence of the first stars. These earliest beacons of light are thought to have warmed the surrounding gas.

However, a detailed map of the cosmic microwave background showed that the gas heating - called reionization - occurred earlier than expected. The implication may be that other sources - like medium-sized black holes - contribute.

"Black holes have an easier time doing the re-warming than stars because their photons are more energetic," Haehnelt told *SPACE.com*.

The first black holes would originate out of the ashes of the first massive stars. Like more massive quasars, these gravitational monsters would generate light by exciting gas that falls into their gaping maws. This light would have heated, or reionized, most of the gas in the universe.

Models for reionization are loaded with uncertainties, so it is not clear that intermediate-mass black holes are actually necessary to make it all work. But there may be a way to confirm their existence in the gravitational shouts from their growing pains.

Merging signals

Besides gas accretion, black holes grow in size by merging. When two black holes spiral into each other, the final titanic clap sends out gravity waves - undulations in the fabric of space-time.

If there was an early population of medium-sized black holes, their mergers might be

Annex 36b

36

observable as observatories are employed to look at the farthest reaches of space and, therefore, way back in time.

"They could potentially be a very significant source of gravitational waves," said Andrew Zentner of the University of Chicago.

Zentner and Savvas Koushiappas of the Swiss Federal Institute of Technology Zurich have studied what might be learned about the first black holes from the proposed Laser Interferometric Space Antenna (LISA), which is a set of space-born gravity wave detectors, scheduled for launch in 2012.

LISA could probably not detect any of the early mergers directly, but it may see a background, or "glow," in gravity waves from the whole history of mergers. This signal could tell researchers how big were the seeds of the supermassive black holes.

"If you turn on LISA and see nothing, it would imply that mergers are not the most important mechanism for creating supermassive black holes," Zentner said.

The alternative might be that big black holes are just born big - forming when a giant cloud of gas collapses in the center of a galaxy. In this way, supermassive black holes would skip an infant and adolescent stage entirely.

This article is part of SPACE.com's weekly Mystery Monday series.

- Missing Black Holes Found
- Runaway Star Collisions Create Black Holes
- 'Astounding' Findings Pin Down Age of Universe, Birth of First Stars
- Hubble Spots Ten Supermassive Black Hole

IMAGES



CLICK TO VIEW

An artist's conception of a black hole, surrounded by an accretion disk. The gas in the accretion disk is heated to millions of degrees and emits radiation. Credit: NASA/Honeywell Max-Q digital group/Dana Berry. Click to enlarge



The Space Top 10s



Vote for your Space Favorites

Space Trivia



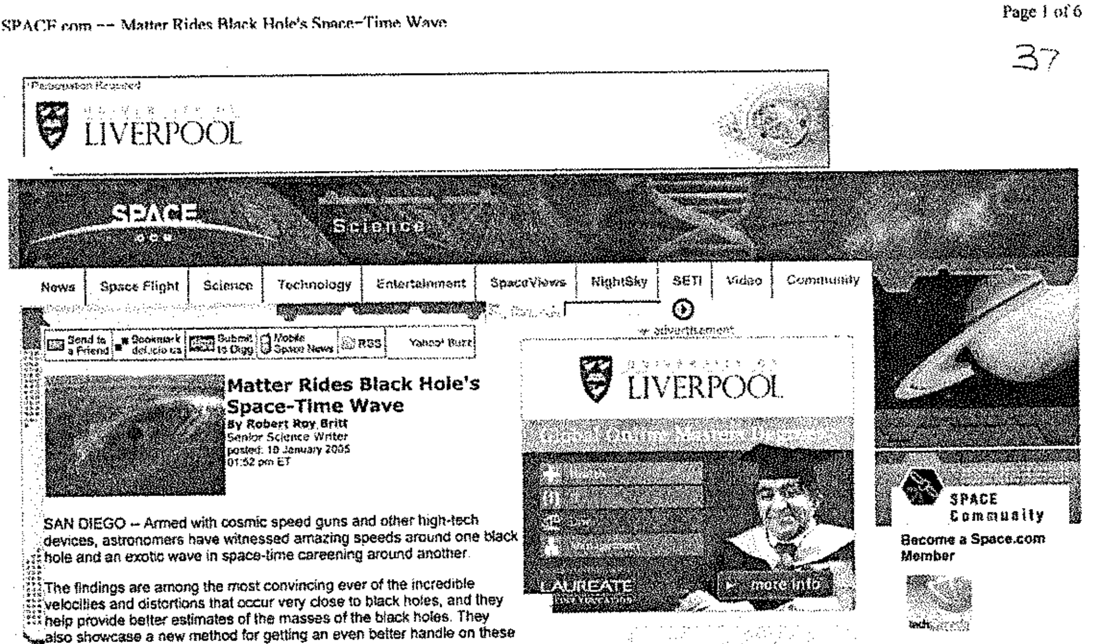
Multimedia Features

SPACE.com Reader Favorites



Space Wallpapers

Annex 37



Matter Rides Black Hole's Space-Time Wave

By Robert Roy Britt
Senior Science Writer
posted: 10 January 2005
01:52 pm ET

SAN DIEGO -- Armed with cosmic speed guns and other high-tech devices, astronomers have witnessed amazing speeds around one black hole and an exotic wave in space-time careening around another.

The findings are among the most convincing ever of the incredible velocities and distortions that occur very close to black holes, and they help provide better estimates of the masses of the black holes. They also showcase a new method for getting an even better handle on these gravitational behemoths.

In one finding, a spinning black hole appears to create an orbiting wave. In a gross oversimplification, the process is similar to the wobble of a spinning top. The other study found evidence of hotspots -- perhaps blobs of hot gas the size of the Sun, or maybe regions lit by magnetic energy -- travelling at 10 percent the speed of light.

Annex 37a

The results were presented here Monday at a meeting of the American Astronomical Society.

Black hole basics

Black holes are so dense they can trap light. They can't be seen, but astronomers find them by noting their gravitational effect on surrounding objects or by seeing X-rays and other radiation kicked up in their vicinity when gas is superheated as it swirls in at phenomenal speeds.

The infalling gas forms a thin disk, theory says. From this accretion disk come the X-rays used in the new research.

Any object with mass warps the space and time around it, in much the same way a heavy object deforms a stretched elastic sheet. Light passing by a very massive star or galaxy can be noticeably bent, for example.

Einstein's work predicts all this. But beyond Einstein, even stranger things are predicted. If an object spins, it further distorts space-time; imagine the elastic sheet being twisted by a heavy, spinning heavy.

The effect is called frame dragging. It is a modification to the simpler aspects of gravity set out by Newton. Working from Einstein's relativity theory, Austrian physicists Joseph Lense and Hans Thirring predicted frame dragging in 1918. (It is also known as the Lense-Thirring effect.)

Other studies have found evidence for spinning black holes and the warping of space-time around them. Even the rotation of Earth has been shown to distort nearby space-time, causing satellites to be dragged by 6 feet (2 meters) every year.

Frame dragging may play an important role in the twisted physics that cause black holes not just to swallow light and matter, but to spit out tremendous amounts of hot gas in high-velocity jets seen in several studies.

A merry-go-round

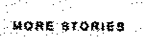
CLICK TO VIEW

Astronomers have discovered evidence for physics beyond Einstein's general relativity. This artist's conception shows a galactic black hole being orbited by a ripple in spacetime--a distortion in the fabric of space itself. Image Credit: Dana Berry (CfA/NASA)



CLICK TO VIEW

This artist's conception shows the binary system GRS1915+105, which shows evidence for a wave of spacetime in its accretion disk. A 10 solar mass black hole at the center of the disk pulls gas from a nearby companion star. The gas spiraling into the black hole heats so much that it emits X-ray radiation. Image Credit: Dana Berry (CfA/NASA)



MORE STORIES

- The True Shape of Black Holes
- Twisted Physics: How Black Holes Spout Off
- The Great Escape: Scientists Detect Black Hole Slowing Flight of Light
- Einstein's Warped View of Space Confirmed

Annex 37b

37

In observations by NASA's orbiting Rossi X-ray Timing Explorer, scientists examined the energy given off by iron gas. The light waves were stretched as the light struggled to climb out of the black hole's gravitational clutches.

The data revealed matter orbiting the relatively small black hole hundreds of times per second, "glowing like light bulbs on a merry-go-round," said Jeroen Homan of MIT.

The effect seen can be described by frame dragging, said co-researcher Jon Miller of the Harvard-Smithsonian Center for Astrophysics. Confident in the finding, he still remains cautious.

"It may be that other explanations turn out to be better, "Miller told *SPACE.com*. "It is not a shut case."

The results will be published in the *Astrophysical Journal Letters*.

Blobs of gas

The other study, using the European Space Agency's XMM-Newton satellite, found three apparent blobs of hot gas flying around a different black hole at 20,000 miles per second (32,190 kilometers per second). That's 10 percent of light-speed. The blobs are very close to the black hole and allow astronomers to calculate a more precise mass and size of the object.

The black hole, anchoring a galaxy known as Markarian 766, contains about 100 million times the mass of the Sun.

The black hole encompasses a region just smaller than the orbit of Mercury. The blobs of iron gas are at a distance equal to the orbit of Jupiter. But unlike Jupiter's 12-year orbit, the blobs circle the black hole in a mere 27 hours.

The speed was measured using the Doppler technique, same as a cop's radar gun. It's also the phenomenon that makes an ambulance siren change pitch when heading toward you (the waves are compressed) versus away from you (the waves are stretched).

It is the first time material has been observed making a complete orbit so close to a black hole, said study member Lance Miller of Oxford University.

Miller and his colleague, study leader Jane Turner of NASA and the University of Maryland Baltimore County, acknowledged that similar but tentative results were announced in September by a European group. And other studies have seen evidence for matter near a black hole, even possibly sliding beyond the point of no return.

In an interview, Turner said the new results were "more clear" and "easy to interpret" compared to previous observations.

Both studies presented today are "pioneering results" that point the direction for future observations that could better pin down the physics of black holes, said Fred Lamb, a University of Illinois researcher who was not involved in the research.

- Animation of the Space-Time Wave
- The Problem With Gravity: Numbers that Don't Add Up



The Space Top 10s



Vote for your Space Favorites



Space Trivia

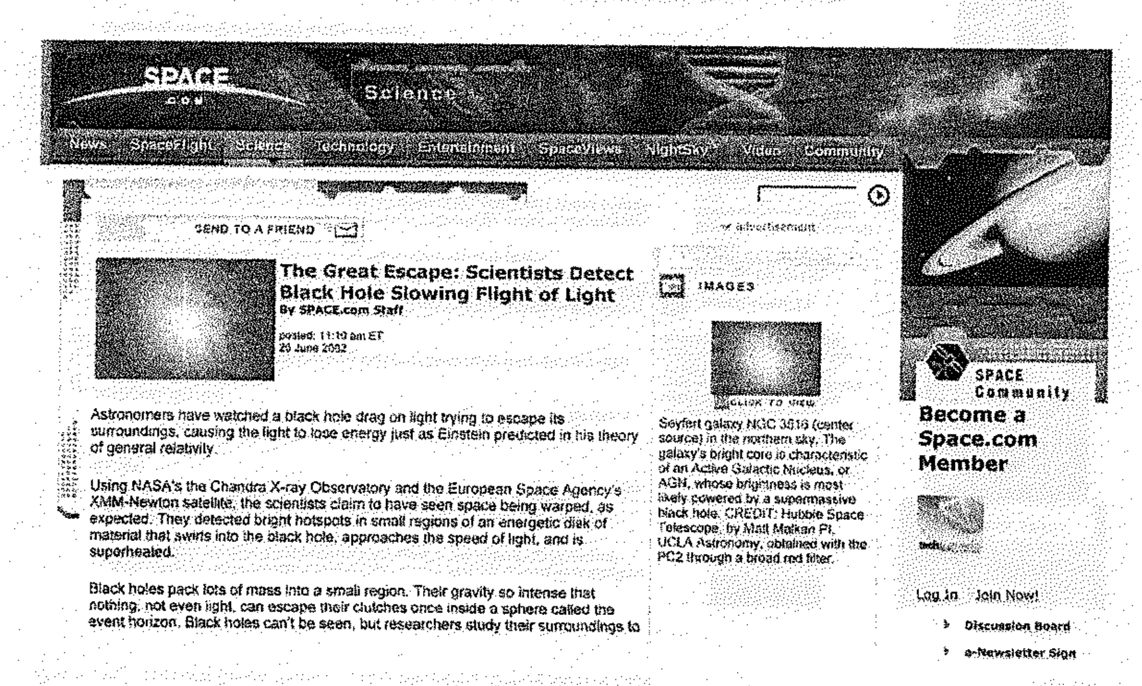


Multimedia Features

SPACE.com Reader Favorites

Space Wallpapers

Annex 38



38

SEND TO A FRIEND

The Great Escape: Scientists Detect Black Hole Slowing Flight of Light

By SPACE.com Staff

posted: 11:10 am ET
26 June 2002

Astronomers have watched a black hole drag on light trying to escape its surroundings, causing the light to lose energy just as Einstein predicted in his theory of general relativity.

Using NASA's the Chandra X-ray Observatory and the European Space Agency's XMM-Newton satellite, the scientists claim to have seen space being warped, as expected. They detected bright hotspots in small regions of an energetic disk of material that swirls into the black hole, approaches the speed of light, and is superheated.

Black holes pack lots of mass into a small region. Their gravity so intense that nothing, not even light, can escape their clutches once inside a sphere called the event horizon. Black holes can't be seen, but researchers study their surroundings to

IMAGES

CLICK TO VIEW

Seyfert galaxy NGC 3516 (center source) in the northern sky. The galaxy's bright core is characteristic of an Active Galactic Nucleus, or AGN, whose brightness is most likely powered by a supermassive black hole. CREDIT: Hubble Space Telescope, by Matt Malkan Pl, UCLA Astronomy, obtained with the PC2 through a broad red filter.

Annex 38a

38

learn about them.

T. Jane Turner of NASA Goddard Space Flight Center and the University of Maryland led the research, which is being published this week in the *Astrophysical Journal*.

The observations involve a spectral characteristic of light typically seen emitted around black holes, called a "broad iron K line." Turner and her colleagues determined that this spectral feature is a result of strong gravity stealing energy from the light.

"The observation rules out several competing theories attempting to explain the broad iron line," Turner said in a statement released today. "We find that Einstein's predictions ring true."

Other tests of general relativity involving studies of black holes have also provided support.

CLICK TO VIEW

This image is from a computer animation illustrating a spinning black hole. The close-up view here represents the immediate vicinity of the black hole, with the event horizon depicted as a black sphere. The surrounding disk of gas, represented by white and blue rings, whirls around the black hole at different speeds, with the material closest to the black hole approaching the speed of light.

MORE STORIES

- Dramatic Increase in Supernova Explosions Looms
- Study Reveals Origin of Jets from Supermassive Black Hole
- Black Holes Find Mates at the Stars' Singles Bars
- Black Hole Dynamo: New Source of Free Energy Fills Universe

The new research looked at a galaxy called NGC 3516, which is thought to harbor a supermassive black hole in its core, which contains the mass of billions of Suns. Gas in this central region glows in X-ray radiation as it is heated to temperatures in the millions of degrees under the force of the black hole's extreme gravity.

Spectral characteristics are features in a graph of light energy, called a spectrograph, which resembles a jagged line with peaks (emission lines) where light shines brightly at a specific energy.

In a laboratory, iron gas bombarded with X-rays emits them as a result, producing a spike at a specific energy in a spectrograph. In space, this spike is distorted, depending on the physical conditions in the emitting gas.

Hot gas orbiting an object, for example, has a double-horned profile due to the Doppler effect. That is, some gas is moving towards us, slightly boosting the energy of its X-ray emission, and other gas is moving away, slightly reducing the energy of its X-rays. This results in a spectral line with two peaks, one for the boosted X-rays and one for the weakened ones.

Turner and her colleagues observed a very complex profile for the iron K line in NGC 3516. This line showed narrow spikes, likely the Doppler peaks from hotspots in the accretion disk lit up by flaring at two locations corresponding to 35 and 175 times the black hole's radius. These narrow features sit atop a broad line component from light across the entire accretion disk, a spectral feature broadened by gravity's pull.

Annex 38b

38

"Imagine looking at a distant sand dune," said Tahir Yaqoob, a Johns Hopkins University researcher who worked on the results. "A familiar object on the dune, like a palm tree, could help you figure out the height of the dune and your distance from it. We have seen hotspots (the trees) in the gas flow (the sand dune) around a black hole. Using these hotspots will enable us to map the curved space-time around a black hole and also measure the rate at which the space-time is forced to rotate with the hole, providing yet further tests of Einstein's general relativity."

The flares that produced these hotspots may be due to a reconnection in the black hole's magnetic field, creating sparks in the accretion disk -- the material spiraling inward. T

The new data may also offer a means to measure black hole spin, a prime goal among astronomers. The energies of the hotspots are a reflection of their distance from the black holes and the black hole spin rate.

More Black Hole News | Astronomy News Briefs



The Space Top 10s



Vote for your Space Favorites



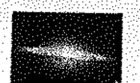
Space Trivia

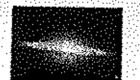


Multimedia Features



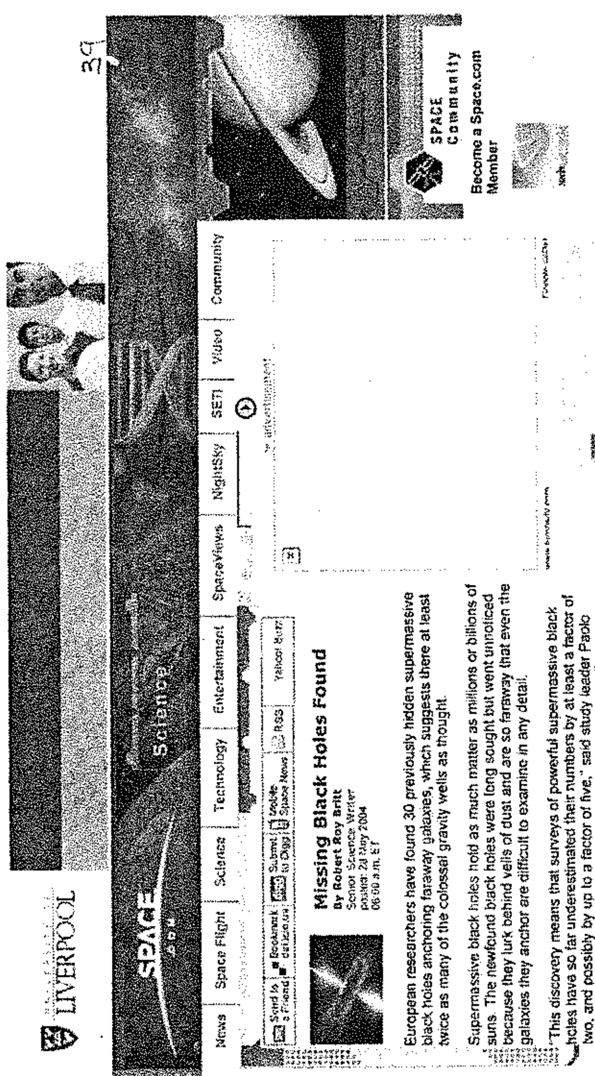
SPACE.com Reader Favorites





Space Wallpapers

Annex 39



SPACE.com — Missing Black Holes Found   Page 1 of 5

Missing Black Holes Found

By Robert Roy Britt
Senior Science Writer
posted: 28 May 2004
06:00 a.m. ET

European researchers have found 30 previously hidden supermassive black holes anchoring faraway galaxies, which suggests there at least twice as many of the colossal gravity wells as thought.

Supermassive black holes hold as much matter as millions or billions of suns. The newfound black holes were long sought but went unnoticed because they lurk behind veils of dust and are so faraway that even the galaxies they anchor are difficult to examine in any detail.

"This discovery means that surveys of powerful supermassive black holes have so far underestimated their numbers by at least a factor of two, and possibly by up to a factor of five," said study leader Paolo Padovani from Space Telescope-European Coordinating Facility and the European Southern Observatory in Munich, Germany.

They were found using the Astrophysical Virtual Observatory (AVO), a database of observations

26/05/31

Annex 39a

from various telescopes. Making the detections required analyzing views from three telescopes: the orbiting Hubble Space Telescope and Chandra X-ray Observatory; and the European Southern Observatory's Very Large Telescope in Chile.

The black holes were all in "active" galaxies, meaning they were actively consuming large quantities of galactic matter. Our Milky Way contains a supermassive black hole but the setup is not currently active. In an active galaxy, a swirling disk of gas and dust, known as a torus, surrounds and largely obscures the central black hole.

The torus looks something like a donut. Inside it is a thinner disk of material, called an accretion disk, that spirals in toward the black hole and is accelerated to a significant fraction of light-speed.

Black holes cannot actually be seen, because they trap all matter and light that enters them. But if an active galaxy is viewed from above, the hole in the middle of the torus allows a good view of the accretion disk, allowing astronomers to infer the presence of the black hole.

The new study looked at galaxies that were edge-on, but deduced the black holes by studying emissions in various wavelengths of the electromagnetic spectrum.

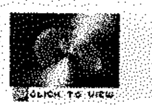
The observations in the AVO database were originally made as part of the Great Observatories Origins Deep Survey (GOODS), which has taken two patches of deep sky and made them the best studied in multiple wavelengths.

"These discoveries highlight the kind of scientific impact that Virtual Observatory technologies and standards will have on astronomy world-wide", said Peter Quinn, director of the AVO.

The findings will be detailed in a future issue of the journal *Astronomy & Astrophysics*.

CLICK TO VIEW

A black hole in an active galaxy is surrounded by a torus, a donut-shaped disk of gas and dust that hides the inner region, as seen in this artist's rendering. As the black hole consumes some of the material, it also superheats some and shoots it out along the galaxy's axis of rotation, in two jets of matter shown here in light blue.



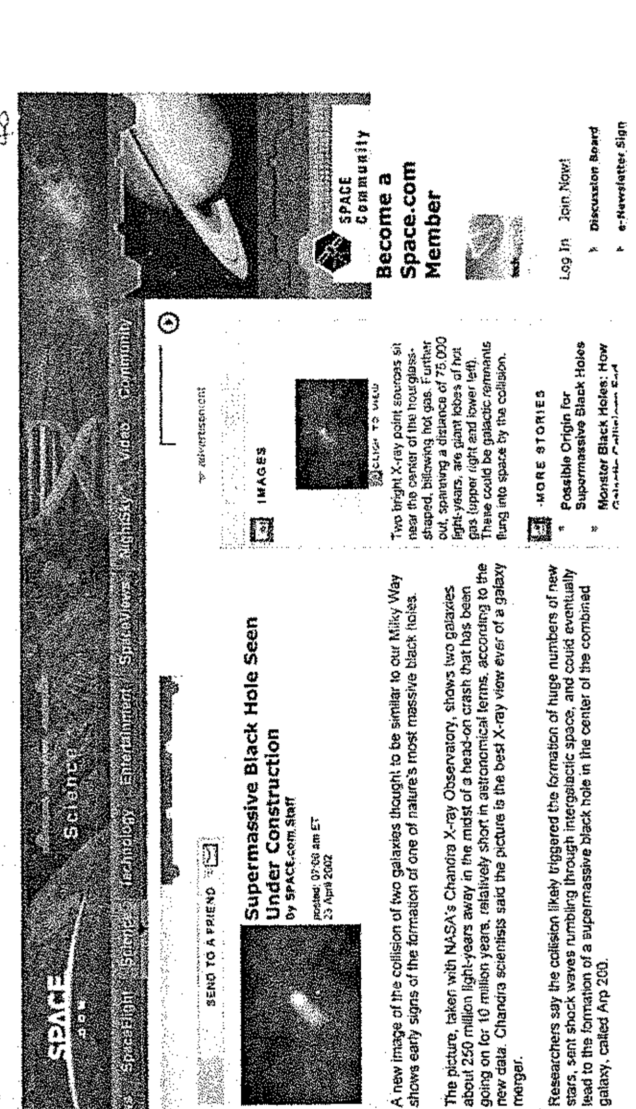
CLICK TO VIEW

Using multiple wavelengths of light, astronomers can see through the dust to view what's going on right around the black hole, allowing its detection. The yellow area is a disk of matter falling into the black hole. It's surrounded by the dust and gas torus, shown in blue.

MORE STORIES

- Now Anyone Can Make a Discovery
- New Astronomy: Romance Fades as Technology Takes Over
- Web-Based Virtual Observatory Discovers Star in Trial Run
- Swirling Dust Near Black Hole Too Thick for Theory

Annex 40



SPACE.com -- Supermassive Black Hole Seen Under Construction

Page 1 of 5

News | Spaceflight | Science | Technology | Entertainment | SpaceViews | Nightsky | Video | Community

SEND TO A FRIEND

Supermassive Black Hole Seen Under Construction

By SPACE.com Staff

posted: 07:08 am ET
23 April 2002

A new image of the collision of two galaxies thought to be similar to our Milky Way shows early signs of the formation of one of nature's most massive black holes.

The picture, taken with NASA's Chandra X-ray Observatory, shows two galaxies about 250 million light-years away in the midst of a head-on crash that has been going on for 10 million years, relatively short in astronomical terms, according to the new data. Chandra scientists said the picture is the best X-ray view ever of a galaxy merger.

Researchers say the collision likely triggered the formation of huge numbers of new stars, sent shock waves rumbling through intergalactic space, and could eventually lead to the formation of a supermassive black hole in the center of the combined galaxy, called Arp 220.

advertisement

IMAGES

CLICK TO VIEW

Two bright X-ray point sources sit near the center of the hourglass-shaped, billowing hot gas. Further out, spanning a distance of 75,000 light-years, are giant lobes of hot gas (upper right and lower left). These could be galactic remnants flung into space by the collision.

MORE STORIES

- Possible Origin for Supermassive Black Holes
- Monster Black Holes: How

SPACE Community

Become a Space.com Member

Log In Join Now!

- Discussion Board
- e-Newsletter Sign

Annex 40a

40

"The Chandra observations show that things really get messed up when two galaxies run into each other at full speed," said David Clements of the Imperial College, London, one of the team members involved in the study. "The event affects everything from the formation of massive black holes to the dispersal of heavy elements into the universe."

Them
* When Black Holes Merge

Astronomers think that many galaxies, including our own, may experience similar collisions at some time during their lives. Arp 220 is considered to be a prototype for understanding what conditions were like in the early universe, when massive galaxies and supermassive black holes were presumably formed by numerous galaxy collisions. It is the closest example of an "ultra-luminous" galaxy, one that gives off a hundred times as much radiation as our galaxy.

The Chandra image shows a bright central region at the waist of a glowing, hour-glass-shaped cloud of multimillion-degree gas. Rushing out of the galaxy at hundreds of thousands of miles per hour, the super-heated as forms a so-called superwind, thought to be due to explosive activity generated by the formation of hundreds of millions of new stars.

Farther out, spanning a distance of 75,000 light years, are giant lobes of hot gas that could be galactic remnants flung into intergalactic space by the early impact of the collision.

Chandra observations allowed astronomers to pinpoint an X-ray source at the exact location of the nucleus of one of the pre-merger galaxies. Another fainter X-ray source nearby may coincide with the nucleus of the other galaxy remnant.

The two X-ray sources are suspected of being black holes, which are thought to spew X-rays from just outside their spheres as matter spirals inward and is superheated. The two are more luminous than stellar black holes, which are typically as massive as a few Suns. But they are relatively weak compared to other supermassive black holes.

So the extraordinary luminosity of Arp 220 may be due to the rapid rate of star formation, astronomers said.

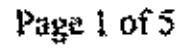
However, in a few hundred million years, this balance of power may change. The two black holes could merge to produce a central supermassive black hole, researchers said. This new arrangement could cause much more gas to fall into the central black hole, creating a power source equal to or greater than that due to star formation.

"The unusual concentration of X-ray sources in the very center of Arp 220 suggests that we could be observing the early stages of the creation of a supermassive black hole and the eventual rise to power of an active galactic nucleus," said Jonathan McDowell of the Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, another member of the team.

Clements and McDowell were joined on this research by an international group of researchers from the United States, United Kingdom and Spain.

More Black Hole News | Astronomy News Briefs

Annex 41



41

SEND TO A FRIEND

Swirling Dust Near Black Hole Too Thick for Theory

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
07 May 2004

A close-up view of a donut-shaped disk of dust around a black hole confirms several expectations about the massive structure but has astronomers wondering how the disk could be so thick.

The black hole packs a mass equal to about 10 million Suns. That's more than twice the mass of the black hole in our Milky Way but many times less than others in the more distant universe. It anchors a nearby galaxy called NGC 1068.

Unlike some supermassive black holes, this one is not surrounded by a tremendously bright region. Astronomers long ago speculated that this and similar black holes might be shrouded in a disk of dust that partially hides the tremendous luminosity that a black hole's sloppy eating habits generate.

The new observations, released this week, are the first to accurately measure this

IMAGES

CLICK TO VIEW

The central region of galaxy NGC 1068. At left is a color image from the Hubble Space Telescope. Center is a VLT image that penetrates the dust and shows central structures. At right is an illustration of the dust structure around the black hole. The hottest area is shown in yellow.

MORE STORIES

- Runaway Star Collisions Create Black Holes
- The True Shape of Black

Annex 41a

41

disk of dust, called a torus. It is about 11 light-years across and a surprising 7 light-years thick.

"The torus probably represents accumulated debris, gas and dust, thrown off from stars farther away from the center of the galaxy that has worked its way inward," explained study leader Walter Jaffe of Leiden University in The Netherlands. "When this material is thrown off by stars it spins around the galaxy just like the original stars did."

Holes

* New Twists on the Milky Way's Big Black Hole
* Voyage into the Vortex: Survival Tips for Black Hole Travelers

Jaffe said centrifugal force should cause the disk to flatten out. Similar thin disks develop around stars, and the rings of Saturn are another example of this flattening process at work.

"One of the difficult-to-explain aspects of our measurement is that the disk is in fact thick, with height not much less than its radius," Jaffe said in an e-mail interview. "We do not know why it hasn't settled down completely into a very thin disk."

The observations were made using an interferometer at the European Southern Observatory's Very Large Telescope. Other findings were not surprising.

The torus of dust is about room temperature at the outer edge, and about 1,832 degrees Fahrenheit (1,000 Celsius) on the inner edge. Inside about 1 or 2 light-years, the disk has been evaporated by hotter temperatures created by frenetic activity around the black hole.

"This is why the dust structure is a torus, with a hole in the middle, rather than a complete disk," Jaffe said.

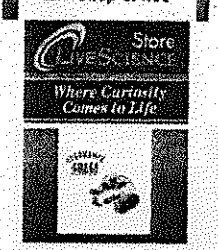
The black hole, whose width is not known, is buried well deep inside the torus.

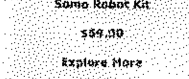
The torus is composed of tiny dust particles similar to rock minerals on the Earth, including silicon, oxygen, and probably aluminum and magnesium, Jaffe said.

▸ More Black Hole News

Up



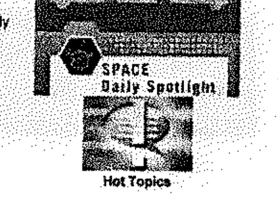




Somo Robot Kit

$59.00

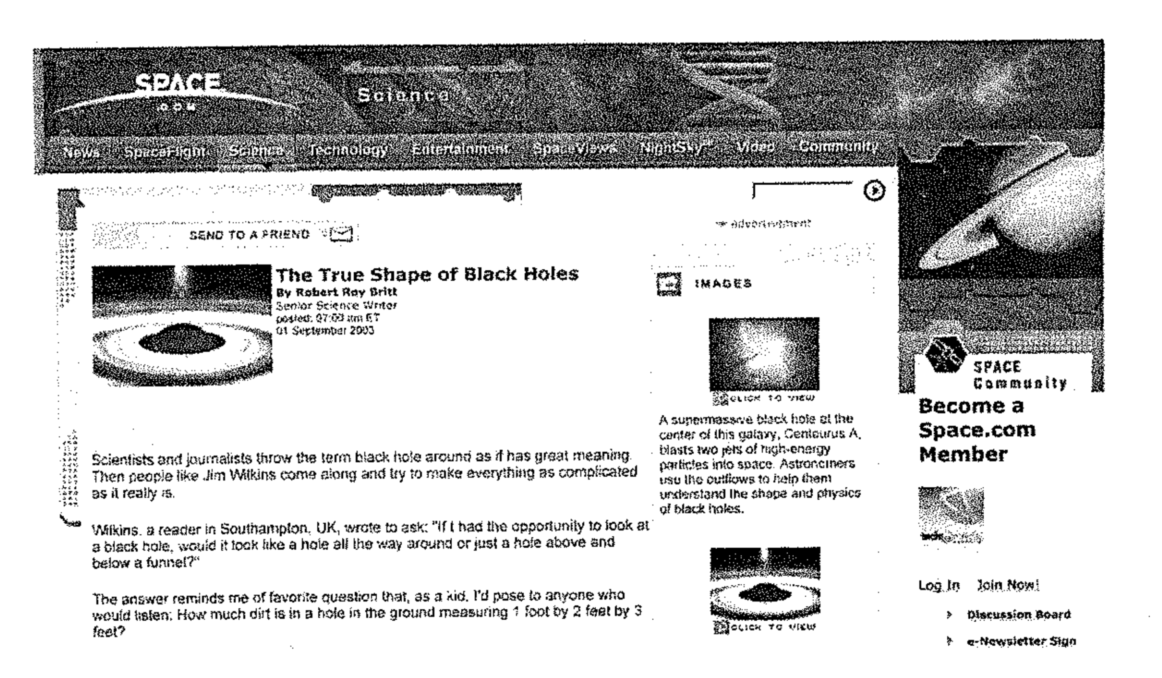
Explore More



Hot Topics

Annex 42

42



The True Shape of Black Holes

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
01 September 2003

Scientists and journalists throw the term black hole around as if has great meaning. Then people like Jim Wilkins come along and try to make everything as complicated as it really is.

Wilkins, a reader in Southampton, UK, wrote to ask: "If I had the opportunity to look at a black hole, would it look like a hole all the way around or just a hole above and below a funnel?"

The answer reminds me of favorite question that, as a kid, I'd pose to anyone who would listen: How much dirt is in a hole in the ground measuring 1 foot by 2 feet by 3 feet?

A supermassive black hole at the center of this galaxy, Centaurus A, blasts two jets of high-energy particles into space. Astronomers use the outflows to help them understand the shape and physics of black holes.

Annex 42a

4-2

We'll get to that later. Back to the question at hand:

A black hole "is not a hole in the usual sense," says Amy Barger of the University of Hawaii Institute for Astronomy.

"But 'hole' describes one of its most important aspects," Barger continues. "Namely, things that go into a black hole cannot come back out. A black hole is like a one-way valve. When dirt is pitched into a hole in the ground, it stays there. Similarly, anything that enters a black hole stays there."

This incredible trapping effect extends to light, which is why we can't see a black hole.

But light passing *near* a black hole can escape capture and just be bent. That's one way scientists study and characterize the thing they can't see: They examine light coming from bright stars or galaxies behind a black hole, note how much it bends, and make inferences.

This computer rendering shows matter whirling into a spinning black hole, whose shape is distorted and not spherical.

MORE STORIES

- **Mars: The Solved and Unsolved Mysteries**
- **Mars Will Not Kill You**
- **Moon Mechanics: What Really Makes Our World Go 'Round**
- **The Greatest Myths, Hoaxes & Mysteries in Astronomy and Space Science**

Even better, black holes are not as stealthy as one might imagine.

A riot of activity surrounds many of them, in fact, providing further clues to what's actually there. When a black hole consumes matter, it does so rather carelessly. As matter spirals inward and is accelerated to significant fractions of light-speed, it is superheated. A bunch of radiation is created, from radio waves to X-rays, and cast off into space for astronomers to examine.

By these indirect observational means, Barger and other black hole experts learn something about what's going on at the fringes of a black hole, the beginning of the invisible realm, a region they call an event horizon. It is there where things slip into oblivion.

The scientists also glean ideas about what a black hole should look like.

"If we could 'see' black holes, they would be of two different types," Barger says. "One type would have the symmetry of a sphere. The other type would have the symmetry of a top. The latter type of black hole possesses the axial-symmetric shape because it has spin."

Yes, black holes spin. That is no big surprise to astronomers, because stars spin, and stars are the progenitors of one class of black holes, the lightweight versions known as stellar black holes that are ubiquitous through our Milky Way galaxy.

Annex 42b

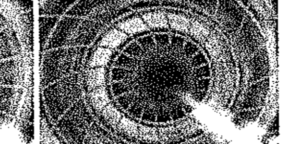
Most descriptions of black holes -- and the illustrations that sometimes accompany them -- depict the objects as spheres and do not mention the alternative look.

However, we must remain cautious about stating anything as hard fact. Black holes are theoretical. We can't see them, so it's hard to prove beyond all doubt that they exist. No mainstream scientists doubt their existence, but these same scientists remain extremely puzzled about the formation, evolution, and physics of Nature's greatest gravitational beasts.

One theory -- and this is not so farfetched by black hole standards -- suggests there are five dimensions of space-time involved with a nonspherical, rotating, donut-shaped "black ring." Other research, using computer simulations, shows that at the very least, the fabric of space-time is distorted around a spinning black hole.

Black holes, black tops, black rings. Obviously, there are hefty differences between a hole in space and a hole in your backyard.

Perhaps the simplest distinction is this: A black hole can pack the mass of several suns into a region of space comparable to the size of a city. But a 1 foot by 2 foot by 3 hole in the ground -- checking to see if you're paying attention here -- has nothing in it.





Messing with space and time
This artist's concept illustrates the difference between a spinning black hole (right) and one that is not spinning (left). In both computer images, looking down from above, the central dark circle represents the black hole's point of no return, called the event horizon.

The surrounding blue and white rings are hot gas whirling around and toward the black hole, much like water near a bathtub drain. The green grid depicts space-time coordinates, distorted by the spinning black hole at right.

IMAGE: NASA/HONEYWELL MAX-Q DIGITAL GROUP/DANA BERRY

Mystery Monday, a new feature on SPACE.com, appears weekly.



The Space Top 10s







Vote for your Space Favorites

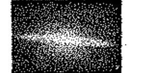


Space Trivia

Multimedia Features

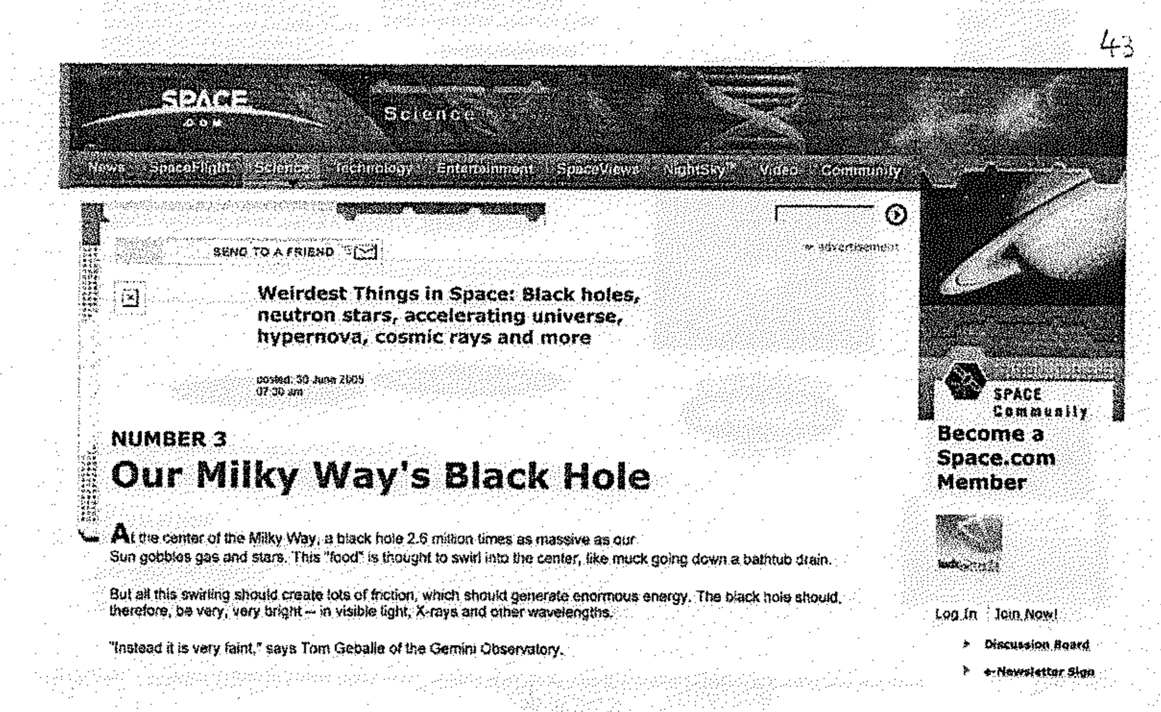


SPACE.com Reader Favorites



Space Wallpapers

Annex 43



43

Weirdest Things in Space: Black holes, neutron stars, accelerating universe, hypernova, cosmic rays and more

posted: 30 June 2005
07:30 am

NUMBER 3

Our Milky Way's Black Hole

At the center of the Milky Way, a black hole 2.6 million times as massive as our Sun gobbles gas and stars. This "food" is thought to swirl into the center, like muck going down a bathtub drain.

But all this swirling should create lots of friction, which should generate enormous energy. The black hole should, therefore, be very, very bright -- in visible light, X-rays and other wavelengths.

"Instead it is very faint," says Tom Geballe of the Gemini Observatory.

Annex 43a

43

Why? Is there not much stuff falling in? Or is the stuff falling *directly* in instead of swirling, thereby creating less friction? Or is some unknown effect preventing us from seeing the radiation?

"Nobody is sure," Geballe says, but he suspects we may learn the answer in the next 5 to 10 years.

"One might argue that all black holes always will be strange," he said. "So perhaps I should simply predict that the galactic center black hole will no longer be considered stranger than other black holes by 2010."

< learn more   next weird thing >

Return to the Main Weird Page

Weird Fact
Black holes are now thought to exist at the center of most or a



Scientists say the Milky Way's black hole, when it was younger and more active, may have looked a lot like the one in this artist's conception.

Agree with the list? No? Uplink your views!

More About Our Milky Way's Black Hole

Since no one has ever actually seen a black hole, how do astronomers even know there's one at the center of the Milky Way?

Geballe offers up an analogy. Around our Sun, the inner planets move more rapidly than the outer planets. By measuring those speeds, astronomers can calculate the mass of the Sun.

Likewise, astronomers observe that stars and gas near the center of our galaxy move faster than the stuff farther out. So some object has to be at the center, exerting a certain gravity that causes such speeds. This technique unambiguously shows a mass of 2.6 million Suns in a very small volume of

Related Information

Black Holes More Powerful Than Expected, And Still Growing

Scientists Pinpoint Milky Way Galaxy's Black Hole



Annex 43b

43

space, Geballe says.

"From the small volume that this mass must inhabit, we know that the only physically realistic object that can have that mass is a black hole," he says.

Astronomers see all kinds of radiation emitted from the black holes in other galaxies -- X-ray, infrared, ultraviolet, visible light and radio waves. The only signature of the Milky Way's black hole, however, is some radio radiation.

Ultraviolet and visible wavelengths are blocked by interstellar dust between Earth and the center of the galaxy. But the other wavelengths can penetrate this dust. Geballe says better instruments may be needed to solve the mystery.

Researchers May Soon View Shadow of Elusive Black Hole

Maverick Black Holes Discovered

The Milky Way: A Tourist's Guide

Other Weird Things

A Glowing Discovery at the Forefront of Our Plunge Through Space

Abrupt End to Journey of an Interstellar Dust Grain

18 Homeless Planets Discovered

Meanwhile, theoretical astrophysicists are on the case, trying to come up with a theory that would account for the weird faintness of the black hole at the center of the Milky Way.

Return to the Main Weird Page , Next Weird Thing

1 2 3 4 5 6 7 8 9 10 | >> Continue with this story >



The Space Top 10s

Vote for your Space Favorites

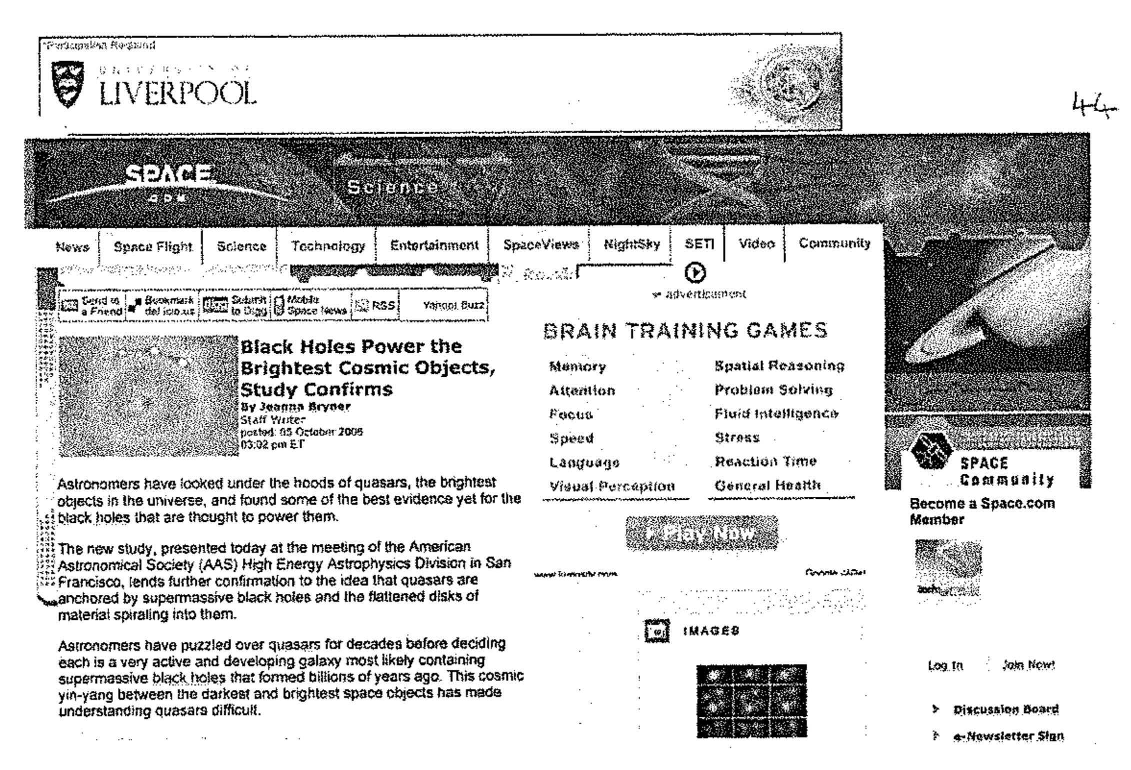
Space Trivia

Multimedia Features

SPACE.com Reader Favorites

Space Wallpapers

Annex 44



SPACE.com — Black Holes Power the Brightest Cosmic Objects, Study Confirms

Page 1 of 5

44

LIVERPOOL

News | Space Flight | Science | Technology | Entertainment | SpaceViews | NightSky | SETI | Video | Community

Send to a Friend | Bookmark del.icio.us | Submit to Digg | Mobile Space News | RSS | Yahoo! Buzz

Black Holes Power the Brightest Cosmic Objects, Study Confirms

By Jeanna Bryner
Staff Writer
posted: 05 October 2006
03:02 pm ET

Astronomers have looked under the hoods of quasars, the brightest objects in the universe, and found some of the best evidence yet for the black holes that are thought to power them.

The new study, presented today at the meeting of the American Astronomical Society (AAS) High Energy Astrophysics Division in San Francisco, lends further confirmation to the idea that quasars are anchored by supermassive black holes and the flattened disks of material spiraling into them.

Astronomers have puzzled over quasars for decades before deciding each is a very active and developing galaxy most likely containing supermassive black holes that formed billions of years ago. This cosmic yin-yang between the darkest and brightest space objects has made understanding quasars difficult.

IMAGES

SPACE Community

Become a Space.com Member

Log In | Join Now!

- Discussion Board
- e-Newsletter Sign

http://www.space.com/scienceastronomy/061005_quasar_anatomy.html

26/05/31

Annex 44a

44

Black holes are so dense that nothing, not even light, can escape their gravitational clutches, making them impossible to observe directly. And even though quasars, or quasi-stellar radio sources, are the universe's most powerful sources of constant light, they are billions of light-years away. So even with the most powerful telescopes they appear as pinpoints of light. On top of that, the dust and gas lit up by a quasar makes seeing inside one a great challenge.

The researchers led by Xinyu Dai and Christopher Kochanek of Ohio State University were only able to view the interior structures of the two quasars, named RXJ1131-1231 and Q2237+0305, when a galaxy lined up between them and the Earth, magnifying their light--a phenomenon called gravitational microlensing. Like a Sumo wrestler rolling over and deforming a soft mat, the weighty galaxy dented, or curved, the fabric of space-time, rerouting and in this case focusing light from the quasars behind it.

The magnification allows astronomers to see quasars that would otherwise have remained invisible.

"Luckily for us, sometimes stars and galaxies act as very high-resolution telescopes," Kochanek said. "Now we're not just looking at a quasar, we're probing the very inside of a quasar and getting down to where the black hole is."

With NASA's Chandra X-Ray Observatory, coupled with measurements from optical telescopes, the astronomers were able to measure the size of the so-called accretion disk inside each quasar, one of which spanned about 14 astronomical units (AU), where one AU is the distance from Earth to the sun.

"It's the first time anyone has measured the size of the disk around one of these black holes," Kochanek told *SPACE.com*.

CLICK TO VIEW

A mosaic of X-ray images of the quasar Q2237+0305, magnified by a gravitational lens. The bright spots are four magnified images of the same quasar, which change in brightness over time. Credit: Courtesy of Ohio State University

CLICK TO VIEW

An optical image of the quasar RXJ1131-1231, magnified by a gravitational lens. The red spot in the center is the galaxy that is acting as a lens, while the four bright spots (three top, one bottom) are magnified images of the same quasar. Credit: Courtesy of Ohio State University



CLICK TO VIEW

Magnification patterns of X-ray emission for the quasar RXJ1131-1231. Credit: Courtesy of Ohio State University

CLICK TO VIEW

Annex 44b

44

The disks each surrounded an area that was emitting X-rays, a telltale sign that the material at the disk's center is being heated up as it speeds up prior to falling into the black hole.

The astronomers are currently studying 20 such lensed quasars, and they hope to gather X-ray data on all of them.

- The Top 10 Star Mysteries
- Key Found to Birth of Super-Galaxies
- Vote Now: The Strangest Things in Space
- Seeing the Universe with Einstein's Glasses

Comments (0)

You must be logged in to post a comment: Log In | Register

Magnification patterns of optical emission for the quasar RXJ1131-1231. Credit: Courtesy of Ohio State University.





The Space Top 10s





Vote for your Space Favorites





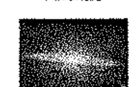
Space Trivia



Multimedia Features

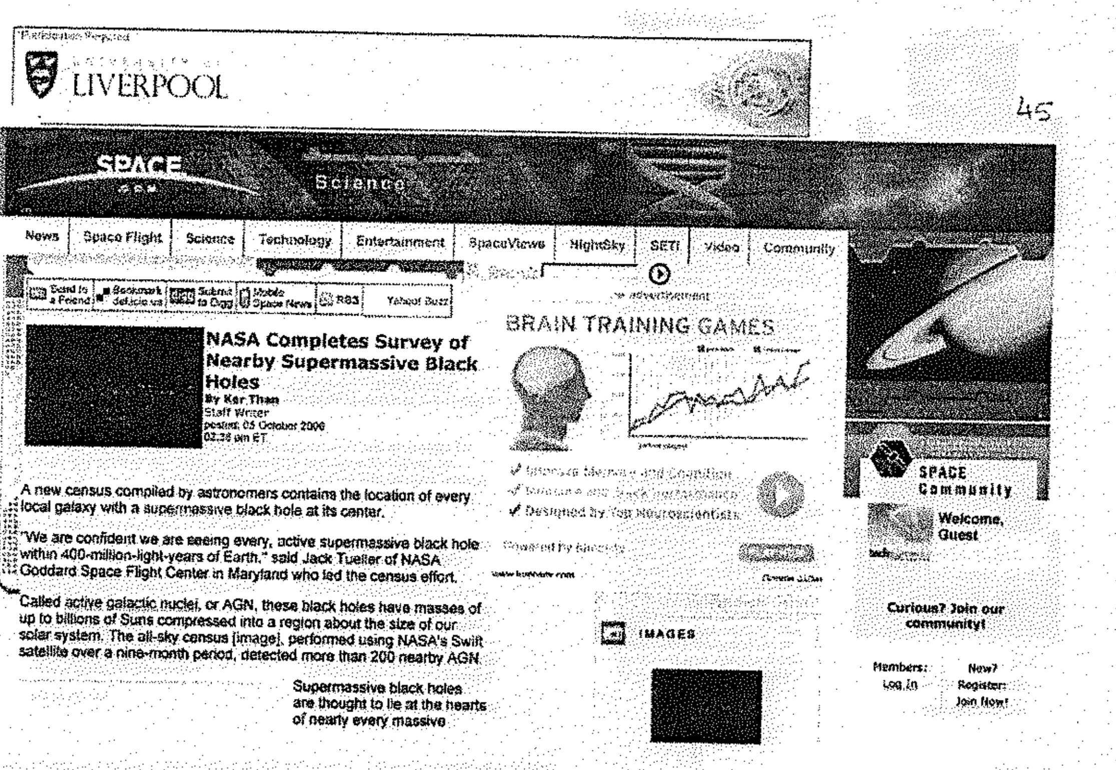


SPACE.com Reader Favorites



Space Wallpapers

Annex 45



SPACE.com — NASA Completes Survey of Nearby Supermassive Black Holes

Page 1 of 5

45

LIVERPOOL

SPACE

Science

News | Space Flight | Science | Technology | Entertainment | SpaceViews | NightSky | SETI | Video | Community

Send to a Friend | Bookmark del.icio.us | Submit to Digg | Mobile Space News | RSS | Yahoo! Buzz

NASA Completes Survey of Nearby Supermassive Black Holes

By Ker Than
Staff Writer
posted: 05 October 2006
02:38 pm ET

A new census compiled by astronomers contains the location of every local galaxy with a supermassive black hole at its center.

"We are confident we are seeing every, active supermassive black hole within 400-million-light-years of Earth," said Jack Tueller of NASA Goddard Space Flight Center in Maryland who led the census effort.

Called active galactic nuclei, or AGN, these black holes have masses of up to billions of Suns compressed into a region about the size of our solar system. The all-sky census [image], performed using NASA's Swift satellite over a nine-month period, detected more than 200 nearby AGN.

Supermassive black holes are thought to lie at the hearts of nearly every massive

IMAGES

SPACE Community

Welcome, Guest

Curious? Join our community!

Members: Log In

New? Register: Join Now!

http://www.space.com/scienceastronomy/061005_agn_census.html

26/05/31

Annex 45a

galaxy, but only a few percent appear to be active. The black holes of some galaxies, like our Milky Way, were likely once active but are now dormant for reasons that are still unclear. One idea is that they've simply consumed all the material in their immediate vicinities. Such dormant supermassive black holes were not counted in the survey.

Among the key findings from the survey [image] was the detection of AGN in so-called "starbursts" galaxies with intense star forming activity. These discoveries will enable scientists to test a theory called "co-evolution," which states that black hole activity and star formation go hand in hand, the researchers say.

The findings were presented at a press conference today at the meeting of the American Astronomical Society's High Energy Astrophysics Division in San Francisco.

- Journey to the Black Hole
- Top 10 Strangest Things in Space
- New Twists on the Milky Way's Big Black Hole
- Surprising Second Black Hole Found in Milky Way's Center

CLICK TO VIEW

Shown here are higher-energy X-ray objects in or near our galaxy. The sources are largely stellar-mass black holes, neutron stars, pulsars and supernova remnants. The colors depict X-ray energy in which red is lower energy and blue is the highest; white is an even mix of lower-energy and higher-energy X-ray photons. These sources are not included in the Swift survey because they are too distant for the satellite to image. Credit: NASA/Swift/BAT/Markwardt et al.

CLICK TO VIEW

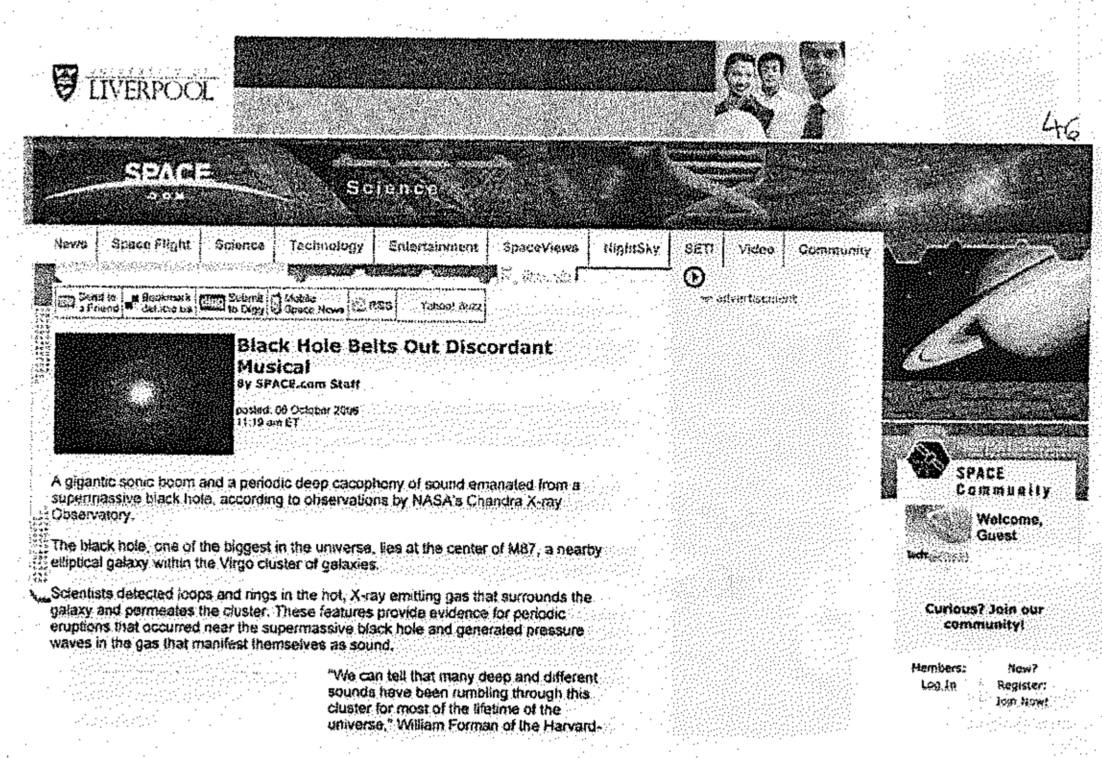
This all-sky map contains all active supermassive black holes out to a distance of 400 million light years from Earth. Scientists are convinced that no active black hole has gone uncounted. Shown here are all high-energy X-ray sources, which includes many star systems within our galaxy which are not part of the Swift black hole survey. The AGN are the light blue and green dots, largely "high" in the sky above and below the galactic plane. Credit: NASA/Swift/BAT/Markwardt et al.

COOL STUFF

- Discussion Board
- e-Newsletter Sign Up

45

Annex 46



46

News | Space Flight | Science | Technology | Entertainment | SpaceViews | NightSky | SETI | Video | Community

Send to a Friend | Bookmark del.icio.us | Submit to Digg | Mobile Space News | RSS | Yahoo! Buzz

Black Hole Belts Out Discordant Musical

By SPACE.com Staff

posted: 06 October 2006
11:19 am ET

A gigantic sonic boom and a periodic deep cacophony of sound emanated from a supermassive black hole, according to observations by NASA's Chandra X-ray Observatory.

The black hole, one of the biggest in the universe, lies at the center of M87, a nearby elliptical galaxy within the Virgo cluster of galaxies.

Scientists detected loops and rings in the hot, X-ray emitting gas that surrounds the galaxy and permeates the cluster. These features provide evidence for periodic eruptions that occurred near the supermassive black hole and generated pressure waves in the gas that manifest themselves as sound.

"We can tell that many deep and different sounds have been rumbling through this cluster for most of the lifetime of the universe," William Forman of the Harvard-

SPACE Community

Welcome, Guest

Curious? Join our community!

Members: Log In

New? Register: Join Now!

Annex 46a

46

Smithsonian Center for Astrophysics said yesterday.

These noisy outbursts occur when material falls toward the black hole. While the black hole devours most of the material, some of it is violently ejected in jets from regions close to the black hole that push into the cluster's gas.

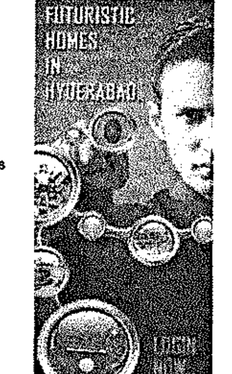
These outbursts occur every few million years and prevent the gas from cooling and forming new stars, which is why M87 has retained its elliptical shape.

"If this black hole wasn't making all of this noise, M87 could have been a completely different type of galaxy, possibly a huge spiral galaxy about 30 times brighter than the Milky Way," said team member Paul Nulsen.

The Chandra observations also found a nearly circular ring [image] of high-energy X-rays about 85,000 light-years in diameter centered on the black hole. It is the strongest evidence to date of a shock wave produced by a powerful explosion, the astronomers said.

Sound from a black hole has been detected before: A black hole in the Perseus cluster was calculated to have a note about 57 octaves below middle C. The sound from M87's black hole is more discordant and deeper, with some sound waves implying a note around 56 octaves below middle C. Large outbursts, like the sonic boom, are evidence of deeper notes, closer to 58 or 59 octaves below middle C.

- Sounds in Space: Silencing Misconceptions
- NASA Completes Survey of Nearby Supermassive Black Holes
- Black Holes Power the Brightest Cosmic Objects, Study Confirms
- The Strangest Things in Space
- All About Black Holes



- Discussion Board
- e-Newsletter Sign Up



Atlas of the Sky

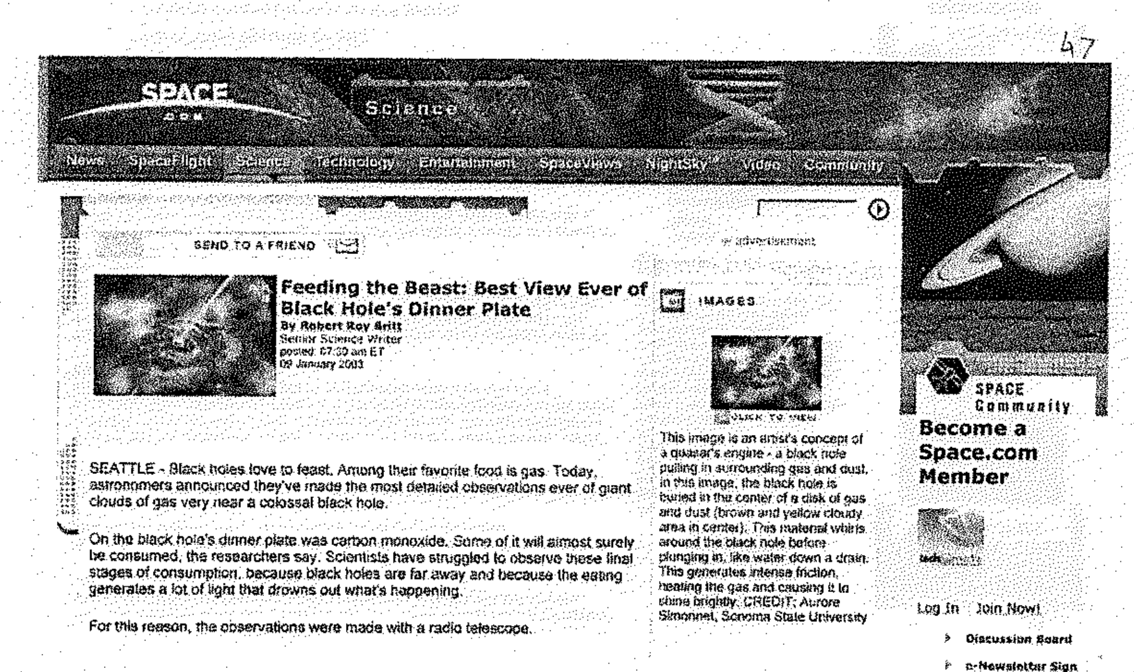
$19.95

Explore More

SPACE Daily Spotlight

Hot Topics

Annex 47



Feeding the Beast: Best View Ever of Black Hole's Dinner Plate

By Robert Roy Britt
Senior Science Writer
posted: 07:30 am ET
09 January 2003

SEATTLE - Black holes love to feast. Among their favorite food is gas. Today, astronomers announced they've made the most detailed observations ever of giant clouds of gas very near a colossal black hole.

On the black hole's dinner plate was carbon monoxide. Some of it will almost surely be consumed, the researchers say. Scientists have struggled to observe these final stages of consumption, because black holes are far away and because the eating generates a lot of light that drowns out what's happening.

For this reason, the observations were made with a radio telescope.

This image is an artist's concept of a quasar's engine - a black hole pulling in surrounding gas and dust. In this image, the black hole is buried in the center of a disk of gas and dust (brown and yellow cloudy area in center). This material whirls around the black hole before plunging in, like water down a drain. This generates intense friction, heating the gas and causing it to shine brightly. CREDIT: Aurore Simonnet, Sonoma State University

Annex 47a

"We have hints that some of the cold gas clouds may be moving toward the galactic center," said Johannes Staguhn, a radio astronomer at NASA and the Science Systems and Applications corporation.

Meanwhile, the cool gas, arranged in a ring around the center of a distant galaxy, is likely the site of some pretty incredible star formation, Staguhn said.

The findings, along with an artist's rendering of what the scene might look like, were released here today at a meeting of the American Astronomical Society

Staguhn and his colleagues studied a highly active galaxy, called a quasar, that is some 800 million light years away. Quasars shines fiercely. The new observations are a step toward determining if there is a link between star formation and the bright activity of quasars, which is thought to be generated when stuff falls into a supermassive central black hole.

The thinking goes like this: While some of the gas in the clouds collapses under its own weight to form stars, a portion of it leaks inward toward the black hole. The immense gravity of the black hole accelerates the gas to nearly the speed of light, superheating it and creating tremendous radiation before most of the gas is swallowed.

The gas clouds orbit about 4,000 light-years from the quasar's center, at a speed of nearly 125 miles every second (200 kps). They contain the mass of more than a billion suns.

The researches also found evidence that the quasar might be interacting with a neighboring galaxy. Galaxy mergers are thought to fuel star formation, and Staguhn is eager to learn whether the same is true when quasars absorb other galaxies.

The observations were made with the National Science Foundation's Berkeley Illinois Maryland Association (BIMA) radio telescope array at Hat Creek, Calif.

- **Top 10 Space Mysteries for 2003**
- **Complete Coverage of the 201st AAS Meeting**

Marketplace Links

CLICK TO VIEW

The left is a composite of a Hubble Space Telescope infrared image (orange and white areas) of quasar galaxy QSO I Zw 1 overlaid with a contour-line image from the Plateau de Bure (PdBI) radio telescope interferometer array in Hautes Alpes, France. White represents the highest intensity infrared light, orange-red represents the lowest. The right image is a more detailed image of the galaxy's center, taken with The National Science Foundation's Berkeley Illinois Maryland Assoc in Hat Creek, CA.

MORE STORIES

- **Twinkle, Twinkle, Little Quasar**
- **Celestial Neighbors Not As Close As They Appear**
- **Single Quasar Turns Out To Be Twins**
- **Chandra Sees Stream of Energy Zooming From Nearby Galaxy**

Up 47

Shop SPACE

Starry Night Store Software & DVDs



Special Offer: One Year Membership to the National Space Society, Free Subscription to Ad Astra magazine, plus Starry Night Constellation Adventure

$45.00

Explore More







Hot Topics

Annex 48

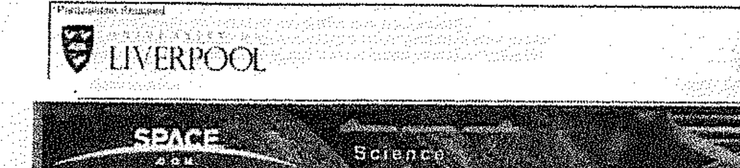
LIVERPOOL

49

SPACE.com Science

News | Space Flight | Science | Technology | Entertainment | SpaceViews | NightSky | SETI | Video | Community

Send to a Friend | Bookmark del.icio.us | Submit to Digg | Mobile Space News | RSS | Yahoo! Buzz



Forces of Creation: Black Holes Spark Star Formation

By Robert Roy Britt
Senior Science Writer
posted: 07 February 2005
06:49 am ET

New observations portray black holes as Jekyll and Hyde characters. They can be creators as well as destroyers.

The classic view of black holes conjures images of gas and stars and even light being swallowed. That's why they're black. But when black holes feed, they create powerful high-speed jets that race at nearly light-speed into surrounding space.

Like a jolt of electricity breathing life into Frankenstein's monster, a black hole's jets can ignite star formation.

Wil van Breugel and Steve Croft of the Lawrence Livermore National Laboratory studied one of these jets slicing through a

IMAGES

SPACE Community

Welcome, Guest

Curious? Join our community!

Members: Log In

New? Register: Join Now!

Annex 48a

puzzling region of intense star formation known as Minkowski's Object. The jet, they say, caused a dense gas cloud to collapse and trigger the star birth.

The finding meshes nicely with a growing body of evidence suggesting black holes are integral players in galaxy formation.

Fiction to fact

"Some 20 years ago this kind of thinking was thought to be science fiction," van Breugel said. "It brings poetic justice to black holes because we think of them as sucking things in, but we've shown that when a jet emits from a black hole, it can bring new life by collapsing clouds and creating new stars."

Minkowski's Object is near a galaxy known as NGC 541. The galaxy's central black hole acts like a giant dynamo, accelerating globs of superheated matter and shooting them out along the axis of rotation. The jets are invisible, but astronomers have detected them with radio telescopes.

In a telephone interview, Croft explained what's going on.

The radio jet plows into a cloud of nearby gas in a supersonic shock wave, compressing and heating the gas. Gas in the cloud becomes ionized, meaning the atoms have lost electrons. After the shock passes, the ions recombine, creating radiation, which transports energy out of the cloud, Croft explained.

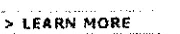
The cooling causes the cloud to contract still further, and when a knot of gas becomes dense enough, it can collapse to form a star.

More to learn

It is not clear how big a role all this plays in galaxy formation. Stars can form without a radio jet around to shock a cloud. Exploding stars known as supernovas, for example, can trigger new star formation.

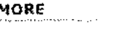
CLICK TO VIEW

This false-color image incorporates infrared data (invisible to the human eye). The blue regions (essentially the whole of Minkowski's Object) show enhanced star formation. The red background galaxy and two red foreground stars appear in sharp contrast. The red overlay is the radio jet.



MORE STORIES

- Matter Rides Black Hole's Space-Time Wave
- The True Shape of Black Holes
- Twisted Physics: How Black Holes Spout Off



COOL STUFF



Searching for SuperStars



Private and pro astronomers bag the biggest blasts the universe has to offer. **Play Clip**

> LEARN MORE

Annex 48b

48

Other studies show black holes play an important role in overall galaxy formation. "The formation of massive black holes is critical to the formation of new galaxies," Croft said.

Most large galaxies have a central black hole, and often they emit jets of high-speed material.

In the first few billion years after the Big Bang, when things were more crowded and chaotic, black hole jets probably triggered star formation in many nascent galleries, the researchers now believe.

"In the early universe this process may be important because the galaxies are still young, with lots of hydrogen gas but few stars, and the black holes are more active," van Breugel said.

Observations for the study were made with the National Radio Astronomy Observatory's Very Large Array, the Keck telescopes in Hawaii and the Hubble Space Telescope. The study was presented last month at a meeting of the American Astronomical Society.

This article is part of SPACE.com's weekly Mystery Monday series.

Comments (0)

You must be logged in to post a comment: Log In | Register

Post a Comment **Sort by:** Newest Oldest Recommended

The Space Top 10s

Vote for your Space Favorites



Space Trivia



Multimedia Features



SPACE.com Reader Favorites

Space Wallpapers

Annex 49

49

Black Holes Could Be Major Power Source

By Deborah Zabarenko
posted: 06:30 pm ET
10 September 1999

WASHINGTON (Reuters) - Black holes, those invisible matter-sucking drains thought to lurk in galaxies' hearts, may be the force behind half the energy released since the universe began, scientists reported on Friday.

Astronomers have presumed for years that black holes emitted a bit of energy, but nothing like the monstrous power spewed by stars. This latest research means that black holes could give stars serious competition on the cosmic power grid.

"Up to now, the thinking was that in the visible universe, all the energy has been released from the center of stars," said Nicholas White of NASA's Goddard Space Flight Center in Maryland.

"This new research suggests that there's a lot more energy being released and it's been hidden by dust and gas," White said in a telephone interview from Bologna, Italy, where he chaired a meeting on X-ray astronomy.

Black holes are high-gravity regions of space that suck in every bit of matter they can grab, not even letting light escape. First postulated in theory early in this

More Stories

Annex 49a

49

century, black holes have been the subject of intense study in recent years, and new data have erased most doubts about their existence.

Because they cannot be seen, black holes have always retained a certain mystery. In fact, much of the power they emit can only be traced through X-rays, according to Andrew Fabian of the University of Cambridge, who presented his research about black holes' energy output at the X-ray meeting.

- X-Ray Spacecraft Looking for Twists in Space-Time
- Evidence Links Black Hole to Supernova Explosion
- Sharp-eyed X-ray Probe Stuns Scientists With First Pictures
- Astronomers Witness Matter Being Sucked Into Black Hole

ENERGY FROM SWIRLING GAS

There are several varieties of black holes. Fabian focused on massive ones, which may contain the mass of millions or even billions of suns packed into a region the size of our solar system. He and others have found that energy is produced as gas swirls into the black hole, gaining tremendous speed and heat as it nears the point of no return.

This hot, fast-moving gas emits lots of radiation, ranging from optical light to X-rays, before being gobbled up. Until recently, only the optical light could be discerned.

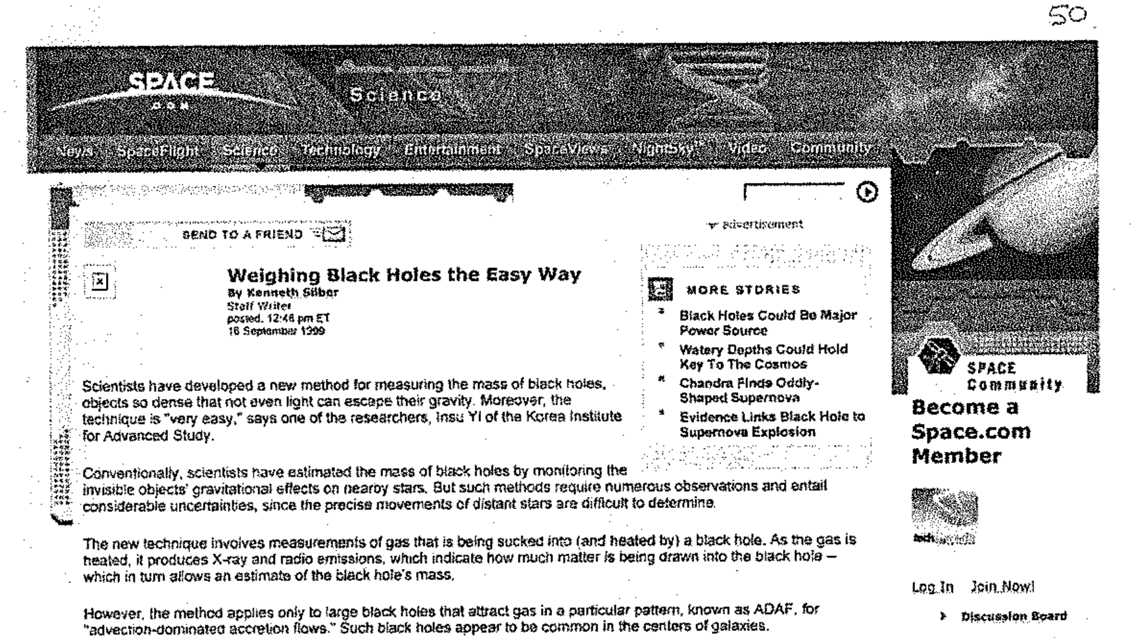
The advent of new X-ray astronomical instruments, including the new Chandra observatory, will either prove or disprove Fabian's theory in the near future, White said.

Steve Maran, assistant director of space science at NASA's Goddard center, said further study is needed.

''The big issue is whether the black holes really provide half the energy released in the universe, or a lesser amount," Maran said by telephone. ''Just the fact that this is a serious possibility shows how giant black holes have gone from hypothetical objects to possible major players in the universe as we understand it."

The total energy produced by stars and black holes does not include the energy emitted in the theoretical Big Bang the scientists believe created the universe.

Annex 50



50

SEND TO A FRIEND

Weighing Black Holes the Easy Way

By Kenneth Silber
Staff Writer
posted: 12:48 pm ET
16 September 1999

MORE STORIES

- Black Holes Could Be Major Power Source
- Watery Depths Could Hold Key To The Cosmos
- Chandra Finds Oddly-Shaped Supernova
- Evidence Links Black Hole to Supernova Explosion

Scientists have developed a new method for measuring the mass of black holes, objects so dense that not even light can escape their gravity. Moreover, the technique is "very easy," says one of the researchers, Insu Yi of the Korea Institute for Advanced Study.

Conventionally, scientists have estimated the mass of black holes by monitoring the invisible objects' gravitational effects on nearby stars. But such methods require numerous observations and entail considerable uncertainties, since the precise movements of distant stars are difficult to determine.

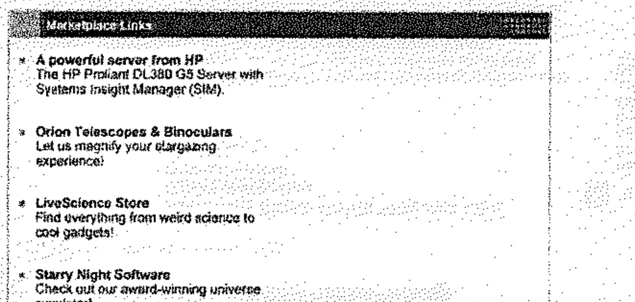
The new technique involves measurements of gas that is being sucked into (and heated by) a black hole. As the gas is heated, it produces X-ray and radio emissions, which indicate how much matter is being drawn into the black hole – which in turn allows an estimate of the black hole's mass.

However, the method applies only to large black holes that attract gas in a particular pattern, known as ADAF, for "advection-dominated accretion flows." Such black holes appear to be common in the centers of galaxies.

Annex 50a

Yi, working with Stephen Boughn of Haverford College, weighed 10 large black holes with this method, and got results that generally agreed with conventional techniques. Yi spoke to space.com from the 5th Compton Seminar, an astronomical conference in New Hampshire where he was presenting the findings.

The new technique is "more efficient" than conventional measurements, says Yi. However, he notes that the accuracy of the respective techniques depends on the data available about particular black holes. He expects the new method to be "complementary" rather than a replacement, but he hopes that it will be "widely adopted."



Annex 51

Spinning Black Holes May Act Like Giant Batteries

By SPACE.com Staff

posted: 12:23 pm ET
22 April 2002

Researchers have found a possible source for enigmatic high-energy particles called cosmic rays in a study that shows rapidly spinning black holes may act as giant batteries, shooting particles into the cosmos at nearly the speed of light.

The study involved four aged galaxies that used to be among the brightest beacons in the universe but are now somewhat worn out. These former quasars, as they would have been called, might help solve a longstanding mystery about cosmic rays.

The galaxies are above the handle of the Big Dipper and visible with backyard telescopes. Each contains a central black hole of at least 100 million solar masses that, if spinning, could fire off atomic particles at great speeds, the scientists said today at a joint meeting of the American Physical Society and the High Energy Astrophysics Division of the American Astronomical Society in Albuquerque, N.M.

The team includes Diego Torres of Princeton University and Elihu Boldt, Timothy Hamilton and Michael Loewenstein of

Annex 51a

NASA's Goddard Space Flight Center.

Quasar galaxies are thousands of times brighter than ordinary galaxies, fueled by a central black hole swallowing copious amounts of interstellar gas. The gas is sped up and superheated, triggering X-rays and other forms of radiation just before it is swallowed.

In galaxies with so-called quasar remnants, the black hole nucleus is no longer a strong source of radiation.

"Some quasar remnants might not be so lifeless after all, keeping busy in their later years," Torres said. "For the first time, we see the hint of a possible connection between the arrival directions of ultra-high energy cosmic rays and locations on the sky of nearby dormant galaxies hosting supermassive black holes."

Ultra high-energy cosmic rays represent one of astrophysics' greatest mysteries.

Each cosmic ray -- essentially a single sub-atomic particle such as a proton traveling just shy of light speed -- packs as much energy as a major league baseball pitch, over 40 million trillion electron volts. The particles' source must be within 200 million light-years of Earth, scientists have said, for cosmic rays from beyond this distance would lose energy as they traveled through the murk of cosmic microwave radiation pervading the universe.

Yet no one has been able to determine what kinds of objects within 200 million light-years could generate such energetic particles.

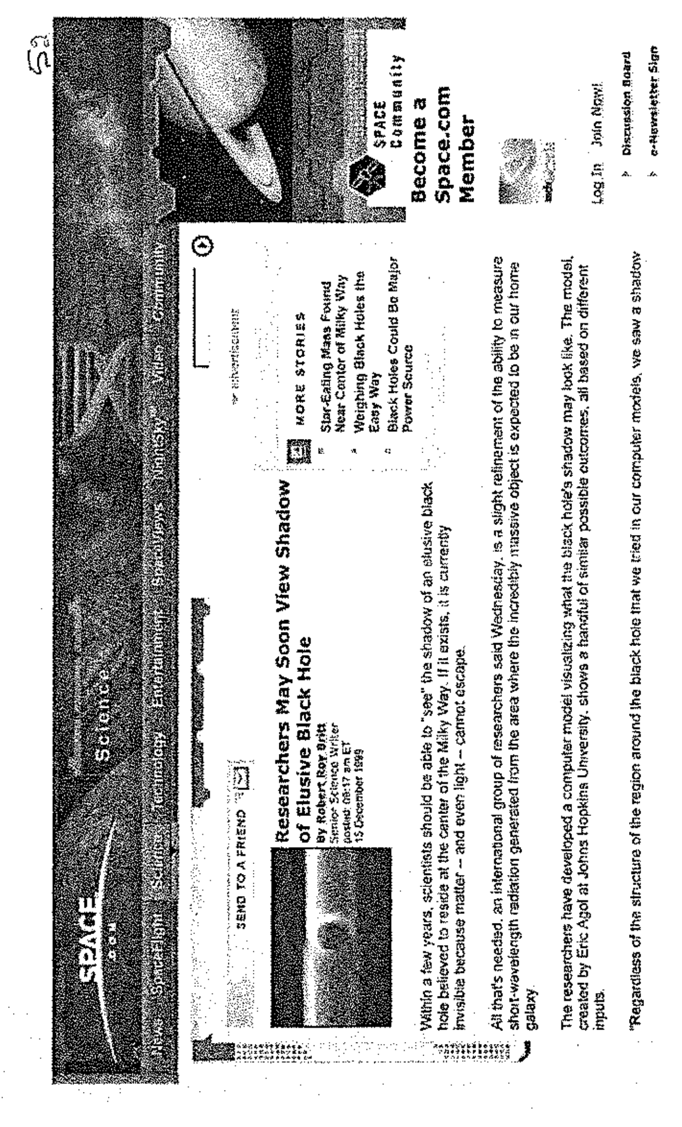
"The very fact that these four giant elliptical galaxies are apparently inactive makes them viable candidates for generating ultra high-energy cosmic rays," Boldt said, adding that drenching radiation from an active quasar would dampen cosmic-ray acceleration, sapping most of their energy.

The team concedes it cannot determine if the black holes in these galaxies are spinning, a basic requirement for a compact dynamo to accelerate ultra-high energy cosmic rays. Yet scientists have shown that it is possible. The prevailing theory is that supermassive black holes spin up as they accrete matter, absorbing orbital energy from the infalling matter.

Ultra-high-energy cosmic rays are extremely rare, striking the Earth's atmosphere at a rate about one per square kilometer per decade.

More Black Hole News | Astronomy News Briefs

Annex 52



SPACE.com Science

News | SpaceFlight | Science | Technology | Entertainment | SpaceViews | NightSky | Video | Community

SEND TO A FRIEND

Researchers May Soon View Shadow of Elusive Black Hole

By Robert Roy Britt
Senior Science Writer
posted: 08:17 am ET
15 December 1999

Within a few years, scientists should be able to "see" the shadow of an elusive black hole believed to reside at the center of the Milky Way. If it exists, it is currently invisible because matter -- and even light -- cannot escape.

All that's needed, an international group of researchers said Wednesday, is a slight refinement of the ability to measure short-wavelength radiation generated from the area where the incredibly massive object is expected to be in our home galaxy.

The researchers have developed a computer model visualizing what the black hole's shadow may look like. The model, created by Eric Agol at Johns Hopkins University, shows a handful of similar possible outcomes, all based on different inputs.

"Regardless of the structure of the region around the black hole that we tried in our computer models, we saw a shadow

advertisement

MORE STORIES

- Star-Eating Mass Found Near Center of Milky Way
- Weighing Black Holes the Easy Way
- Black Holes Could Be Major Power Source

SPACE Community

Become a Space.com Member

Log In | Join Now!

- Discussion Board
- e-Newsletter Sign

Annex 52a

in the simulated images," said Agol, one of the authors of a paper appearing in the January 1, 2000 issue of *Astrophysical Journal Letters*. "This paper is our way of trying to interest astronomers in working together to perform the actual observations, which could produce very exciting results."

Such direct observations, which would display radiation from the mysterious fringes of the black hole -- an area known as the event horizon -- would bring black holes out of the dark recesses of theory and into the realm of the known. The event horizon is thought to be the point of no return for black holes, a somewhat mystical virtual wall behind which the laws of physics are not understood and may be different from what is known.

"Proving that there is an event horizon means there is a part of the world that is separated from our physics," said lead researcher Heino Falcke of the Max-Planck Institute in Germany. "We can't see behind this thing. We can't go behind this thing. And we don't know what's behind. It could be anything."

Falcke told *space.com* that the motivation to model the shadow stemmed from a 1973 theoretical paper by physicist James Bardeen, which Falcke recalled while pondering other aspects of black holes. When he and his colleagues began looking into the resolution needed to image the event horizon, they realized that rapidly improving observational techniques were coming close to what they needed.

The method relies on a cosmic trick called gravitational lensing. As if going through a giant galactic magnifying glass, the light and radio waves passing near a black hole are bent and re-focused, giving researchers what appears to be a larger target to search for. Depending on how much refinement of current methods is needed, Falcke said it could take anywhere from one to 15 years to image the shadow. His estimate is five years or less.

By tracing radiation, in the form of radio waves, emitted from all light around the black hole, Falcke and his colleagues expect the black hole itself will appear as a shadow against the surrounding light.

"The shadow has to be there," he said. "There's no way around it, if (the theory of) general relativity is correct. I'm pretty much convinced that this method is possible."

Simply, Falcke expressed the importance of the possible, eventual image of a black hole's shadow: "That would be the final proof that black holes exist. That defines a black hole. They are black."

What are we looking for?

Black holes are theoretical massive objects that pull nearby matter into their relatively small areas. Even light cannot escape the intense gravity, so researchers have never seen a black hole. They detect them indirectly by noting the gravitational effects on nearby stars, or by detecting powerful radiation given off by gas and other matter that swirls into the object.

Annex 52b

A black hole is believed to exist at the center of the Milky Way, some 25,000 light-years away from Earth. But the density of intervening stars and other matter makes it difficult to see anything near our galactic center.

Near the Milky Way's center, around a star called Sagittarius A*, astronomers have found a compact source of very strong radio emission, perhaps created by highly ionized gas surrounding a black hole, Falcke explains. To study the region, researchers have used Very Long Baseline Interferometry (VLBI), which effectively creates a very wide telescope by combining the results of individual telescopes at various locations on Earth. The technique allows for measuring very short wavelengths of radiation.

"I think we didn't realize before how close the technique is to detecting this shadow," Falcke says. "With the currently available resolution, we could 'see,' from Berlin Germany, a radio source in Los Angeles the size of a mustard seed. Now we have to improve things to the point where we can image a dent on the seed."

For the paper, the authors took what astronomers currently know about the mass of Sagittarius A* and other potential features of the black hole, such as its rotation, and factored this into a "relativistic ray-tracing" program Agol had developed. The program traces the path of electromagnetic radiation through space warped by the gravity of a black hole.

Given the resolution achievable at short radio wavelengths, the calculations showed a distinctive pattern in radiation from Sagittarius A*: a circular shadow.

"With the major observatories working together, and a further improvement of millimeter-VLBI, we should soon be able to actually image the shadow of a black hole. This would be the final test of whether black holes and event horizons exist," Falcke said.

The research was sponsored by the National Science Foundation, NASA, and others.



The Space Top 10s



Vote for your Space Favorites



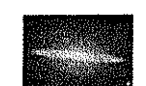
Space Trivia



Multimedia Features



SPACE.com Reader Favorites



Space Wallpapers

Annex 53

53

SEND TO A FRIEND

X-Ray Spacecraft Looking for Twists in Space-Time

By Greg Clark
Staff Writer
posted: 06:53 am ET
03 September 1999

Wrinkles, warps and wobbles in the space-time continuum are slowly breaking out of the realm of the imaginary or predicted.

Long the sole jurisdiction of theoretical physicists and science fiction writers, the peculiarities predicted by Einstein's theory of general relativity are now the target of a small group of spacecraft operators in charge of the Rossi X-ray Explorer.

Launched in late 1995, the Rossi spacecraft is busy observing the regions of the universe where knots in time and curved space might actually exist: the energetic regions around black holes and neutron stars.

Black holes are objects so massive, and the gravity around them so strong, that not even light can escape. Neutron stars are the collapsed remnants of giant stars that have all but annihilated themselves in tremendous explosions called supernovae.

MORE STORIES
- Astronomers Witness Matter Being Sucked into Black Hole
- Sharp-eyed X-ray Probe Stuns Scientists With First Pictures

Annex 53a

These objects are among the most energetic in the galaxy, according to Richard Rothschild, a research physicist at the Center for Astrophysics and Space Sciences at the University of California at San Diego. Neutron stars contain the mass of the sun but are less than 10 miles in diameter, and they spin extremely rapidly -- some as fast as 1000 times per second.

Rothschild leads the team that built one of the three instruments aboard Rossi. To him, X-ray astronomy is particularly exciting, because it is so dynamic.

"If you were to look at the sky with X-ray eyes it would be changing on all sorts of time scales. Almost every object out there would be flickering, either over fractions of a second, to seconds, to hours, to days, to years. And that's sort of the neat part about X-ray astronomy," he said. "You never know what you're going to see."

Some of the main targets of the Rossi observations are systems called binary neutron star pairs. These are systems in which two stars orbit each other, but where one of the pairs is either a neutron star or, in some cases, a black hole. The scientists are using Rossi to watch these star pairs and observing the way material from stars falls into the black holes.

"We can look at binaries that have neutron stars and binaries that have black holes, and contrast them to try to find out what the differences are," Rothschild said. Attributing those differences to either neutron stars or black holes, scientists can learn how matter reacts differently in the two cases. "We can then start to learn a little bit about black holes and the region around them," he said.

Observing the binary systems in this way is the tool Rossi scientists are using to learn whether space and time might behave very differently in regions where gravity is extremely concentrated.

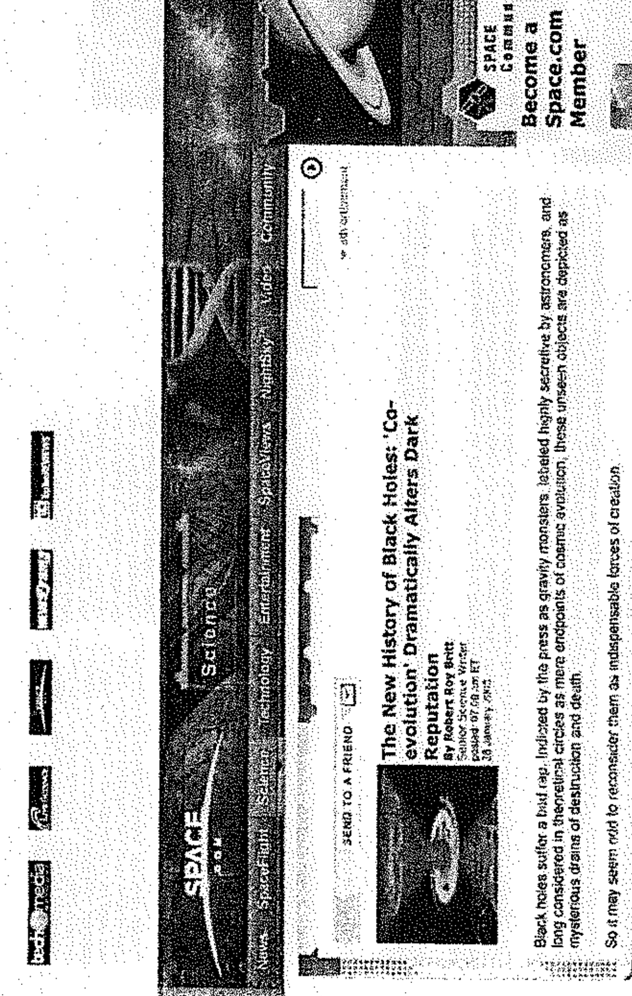
In some cases the X-ray observations have detected signs of material being sucked away from a star in a star/black-hole binary pair and falling into a black hole, Rothschild said. Scientists make careful measurements of the speed at which the material swirls around the black hole and falls into it, looking for signs of knots or curves in space.

"Normally space, we picture it as flat," Rothschild explained. "But as you get in close (to a black hole) it can actually twist. As the black hole is spinning maybe the space starts to go around the black hole a little bit instead of going straight into it.

"If that's what's going on, matter should take a little longer to get to the black hole instead of going straight in because it's had to take this little more circuitous route."

The interpretation of the data is something that is a hot topic of debate among theorists, but with more data and analysis, scientists might actually be able to prove whether space and time are warped and dragged along by the edges of spinning black holes.

Annex 54



SPACE.com — The New History of Black Holes: 'Co-evolution' Dramatically Alters Dark Reputation

Page 1 of 8

54

News SpaceFlight Science Technology Entertainment SpaceViews NightSky Video Community

SEND TO A FRIEND

The New History of Black Holes: 'Co-evolution' Dramatically Alters Dark Reputation

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
[illegible] January 2003

Black holes suffer a bad rap. Indicted by the press as gravity monsters, labeled highly secretive by astronomers, and long considered in theoretical circles as mere endpoints of cosmic evolution, these unseen objects are depicted as mysterious drains of destruction and death.

So it may seem odd to reconsider them as indispensable forces of creation.

Yet this is the bright new picture of black holes and their role in the evolution of the universe. Interviews with more than a half dozen experts presently involved in rewriting the slippery history of these elusive objects reveals black holes as galactic sculptors.

SPACE Community

Become a Space.com Member

Log In Join Now!

[illegible] .com/scienceastronomy/blackhole_history_030128-1.html

25/12/30

Annex 54a

54

In this revised view, which still contains some highly debated facts, fuzzy paragraphs and sketchy initial chapters, black holes are shown to be fundamental forces in the development and ultimate shapes of galaxies and the distribution of stars in them. The new history also shows that a black hole is almost surely a product of the galaxy in which it resides. Neither, it seems, does much without the other.

The emerging theory has a nifty, Darwinist buzzword: co-evolution.

As a thought exercise, co-evolution has been around for less than a decade, or as much as 30 years, depending on who you ask. Many theorists never took it seriously, and no one had much evidence to support it. Only in the past six years or so has it gained steam. And only during the past three years have observations provided rock-solid support and turned co-evolution into *the* mainstream idea among the cognoscenti in both black hole development and galaxy formation.

"The emerging picture of co-evolving black holes and galaxies has turned our view of black holes on its head," says Meg Urry, an astronomer and professor of physics at Yale University. "Previously, black holes were seen as the endpoints of evolution, the final resting state of most or all of the matter in the universe. Now we believe black holes also play a critical role in the birth of galaxies."

The idea is particularly pertinent to explaining how massive galaxies developed in the first billion years of the universe. And it is so new that just last week theorists got what may be the first direct evidence that galaxies actually did form around the earliest black holes.

Chicken-and-egg question

Like archeologists, astronomers spend most of their careers looking back. They like to gather photons that have been traveling across time and space since well before Earth was born, some 4.5 billion years ago. Rogier Windhorst, an Arizona State University astronomer, has peered just about as deep into the past as anyone, to an era when the universe was roughly 5 percent of its present age.

Earlier this month, Windhorst and a colleague, Haojing Yan, released a Hubble Space Telescope image showing the most distant "normal" galaxies ever observed.

Though stretched and distorted by the technique used to spot them (an intervening galaxy cluster was used as a "gravitational lens"), the newfound galaxies, Windhorst's team assures us, resemble our own Milky Way. They are seen as they existed more than 13 billion years ago, within 1 billion years of the Big Bang.

Black Holes & Co-evolution: A Primer

The puzzle
Very compact but bright objects called quasars, which can outshine a thousand normal galaxies, were abundant when the universe was less than 10 percent of its present age. Quasars are powered by black holes weighing more than a billion suns. How did they get so

Annex 54b

54

Practically side-by-side in time, discovered in separate observations made as part of the Sloan Digital Sky Survey, are compact but bright objects known as quasars. These galaxies-to-be shine brilliantly because, researchers believe, each has a gargantuan black hole at its core, whose mass is equal to a billion suns or more, all packed into a region perhaps smaller than our solar system.

The resulting gravity pulls in nearby gas. The material is accelerated to nearly the speed of light, superheated, and swallowed. The process is not entirely efficient, and there is a byproduct: An enormous amount of energy -- radio waves, X-rays and regular light -- hyper-illuminates the whole scene.

Quasars also seem to be surrounded by halos of dark matter, a cryptic and unseen component of all galaxies. Co-existing around and amongst all this, researchers are coming to realize, is a collapsing region of stars and gas as big or larger than our galaxy.

It was no coincidence that the announcements of the two findings -- distant quasars and normal galaxies --were made together at a meeting of the American Astronomical Society (AAS) Jan. 9. Co-evolution was on the minds of the discoverers.

Among co-evolution's significant impacts is its ability to render mostly moot a longstanding chicken-and-egg question in astronomy: Which came first, the galaxy or the black hole?

"How about both?" Windhorst asks. "You could actually have the galaxy form simultaneously around a growing black hole."

Urry, who was not involved in either finding but

big so fast?

The front-running theory
Co-evolution holds that galaxies and supermassive black holes evolve together, each counting on the other for its ultimate heft. If true, and once fully understood, the new theory should help solve the growth puzzle.



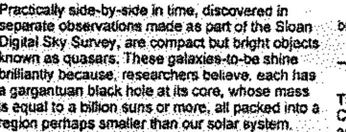
A merger may have triggered the output of energy in this galaxy, Centaurus A.

The evidence

▸**Early quasars** appear to be surrounded by large galaxies loaded with tons of gas, which fuels star formation and feeds the black holes, a report last week suggested.

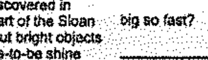
▸**Near the quasars** in time are other, normal galaxies that have likely just passed through a quasar phase, as seen in images released earlier this month.

▸**Central bulges of stars** in many galaxies, such as our Milky Way, are directly related to the masses of the black holes buried inside, as detailed in June of 2000. A galaxy's dimensions seem tied to its black hole's dietary habits.



Black hole mass increases with galactic bulge mass.

▸**Most black hole mass** seems to come from direct



The Space Top 10s

Vote for your Space Favorites



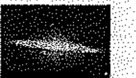
Space Trivia



Multimedia Features



SPACE.com Reader Favorites



Space Wallpapers

Annex 54c

54

was asked to analyze them, explained it this way: "We believe that galaxies and quasars are very intimately connected, that in fact quasars are a phase of galaxy evolution. In our current picture, as every galaxy forms and collapses, it has a brief quasar phase."

So when a quasar goes dormant, what's left are the things we associate with a normal galaxy -- stars and gas swirling around a central and hidden pit of matter.

Quasars are cagey characters, however. (The term is short for quasi-stellar radio source; astronomers first mistook the objects for stars within our galaxy in the early 1960s.) When one is firing, its brightness can exceed a thousand normal galaxies. The quasar outshines its entire host galaxy so significantly that scientists have not been able to see what's really causing all the commotion. That veil is lifting as you read this, however, as telescopic vision extends ever backward in time and data is fed into powerful new computer models.

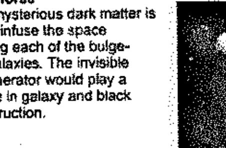
Evolving Idea

Demonstrations of co-evolution began to emerge in the mid-1990s when researchers found hints that the existence of a significant black hole at the center of a galaxy was related to the galaxy's shape, says Martin Haehnelt of the University of Cambridge. Only galaxies with a spherical bulge-like component appear to accommodate supermassive black holes.

consumption (called accretion) of gas, indicating that a black hole needs a surrounding galaxy to grow.

The dark horse

A halo of mysterious dark matter is thought to infuse the space surrounding each of the bulge-packing galaxies. The invisible gravity generator would play a crucial role in galaxy and black hole construction.



Dark matter is studied in part by examining hot gas clouds like this one.

The also-rans

If co-evolution reigns, as most researchers believe, then two older (but not-dead-yet) theories are wrong: that a galaxy forms first and directs the development of a black hole; or that a black hole is generated first, providing the seed around which a galaxy can coalesce. It is also possible that different types of galaxies form by different means, and that co-evolution will only be found to describe one path to galactic adulthood.

-- *Robert Roy Britt*



Visit SPACE.com each Tuesday for another science feature.
Archives



Space Video Collection



Space Image Gallery Collection

Our Milky Way, if it could be viewed edge on, would display a good example of one of these galactic bulges: Imagine the profile of a stereotypical flying saucer, though with a wider and flatter disk. The Milky Way is smaller than many galaxies, however, and it has a correspondingly less massive black hole -- roughly 2.6 million suns worth. It almost surely once had a quasar phase, astronomers say.

Annex 54d

54

At any rate, in the mid-1990s no one knew for sure how prevalent black holes were. Theory and some observational data pointed to the likelihood that they were ubiquitous.

Not So Fast ...

"I think it is still unclear whether black holes play any role in the formation of the first galaxies."

-- Sir Martin Rees
University of Cambridge

Then, in the year 2000, astronomers found solid evidence that black holes lurk deep inside many and probably all galaxies that have the classic central bulge of stars. Further, an analysis showed a direct correlation between the mass in each black hole and the shape and scope of the bulge and the overall size of the galaxy.

At an AAS meeting in June of 2000, John Kormendy of the University of Texas at Austin, presented evidence for 10 mammoth black holes whose masses were related to their galactic bulges. Kormendy worked on a large team of researchers led by University of Michigan astronomer Douglas Richstone. This along with other studies in surrounding months by other teams served as a collective turning point for co-evolution, several researchers now say, advancing it to a stable quantitative footing.

"Subsequently the idea of the co-evolution of galaxies and supermassive black holes became more widely discussed and accepted," Haehnelt says.

Evidence continues to mount. In 2001, two separate teams showed that many smaller galaxies that don't have bulges also do not seem to contain significant black holes.

Over the past six months or so, other important studies have emerged, providing independent confirmation to some of the initial work. Haehnelt: "It becomes more and more clear that supermassive black holes can significantly change the structure and evolution of galaxies."

The first large-scale scientific meeting devoted to co-evolution -- a sure sign of a theory coming into its own -- was held just three months ago, sponsored by the prestigious Carnegie Observatories.

There are many variations on the basic theory of co-evolution. Each version attempts to explain a vexing fact: In the blink of a cosmic eye -- just a half a billion years -- invisible spheres of matter were born, and several gained the mass of a billion or more suns and were driving the shape and texture of swirling agglomerations of newborn stars.

Co-evolution is not a done deal. Perhaps, some have suggested, a huge black hole simply collapses out of a pre-galactic cloud and serves as a ready-made engine to drive further galaxy development. Even staunch supporters of co-evolution say there are still viable theories, not yet refutable, putting the immense black hole in place first, and others that have the galaxy solely responsible for driving the formation of a black hole.

If black holes did grow incrementally, it is unclear whether cooperative construction reigned from the beginning, or if it

Annex 54e

kicked in after some certain amount of mass was gathered.

"I think it is still unclear whether black holes play any role in the formation of the first galaxies," said Cambridge's Sir Martin Rees, who has collaborated with Haehnelt and who long ago authored some of the first scientific papers on the question.

"Indeed," Sir Martin says, "there is a lot of debate about whether black holes can form in very small galaxies, and whether there is a link between the 'small' holes that form as the endpoint of the evolution of massive stars and the holes of above a million solar masses that exist in the centers of galaxies."

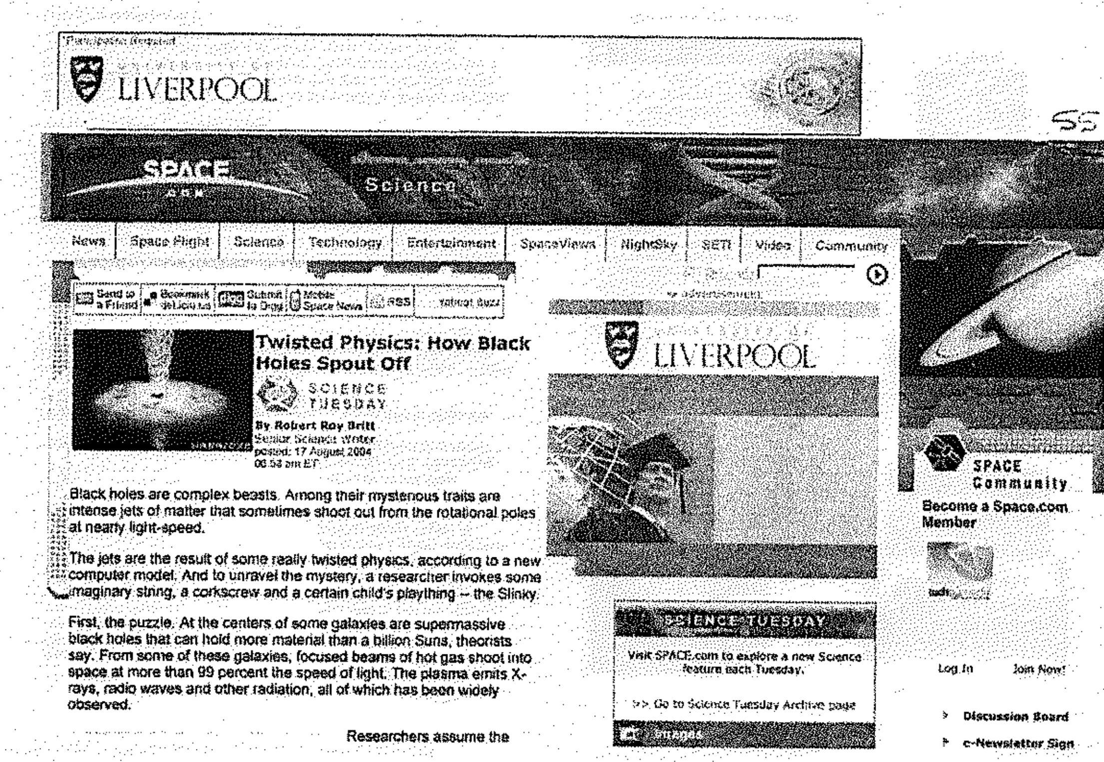
1 2 3 | >> Continue with this story >

Next Page: The First Black Holes

Smack in the middle of the cosmic dark ages, the first stars are born. They die young, populating a crowded universe with relatively puny black holes. How did they grow?

Continue >>>

Annex 55



SPACE.com — Twisted Physics: How Black Holes Spout Off

Page 1 of 6

LIVERPOOL

SPACE

Science

News | Space Flight | Science | Technology | Entertainment | SpaceViews | NightSky | SETI | Video | Community

Send to a Friend | Bookmark del.icio.us | Submit to Digg | Mobile Space News | RSS | Yahoo! Buzz

Twisted Physics: How Black Holes Spout Off

SCIENCE TUESDAY

By Robert Roy Britt
Senior Science Writer
posted: 17 August 2004
06:53 am ET

Black holes are complex beasts. Among their mysterious traits are intense jets of matter that sometimes shoot out from the rotational poles at nearly light-speed.

The jets are the result of some really twisted physics, according to a new computer model. And to unravel the mystery, a researcher invokes some imaginary string, a corkscrew and a certain child's plaything -- the Slinky.

First, the puzzle. At the centers of some galaxies are supermassive black holes that can hold more material than a billion Suns, theorists say. From some of these galaxies, focused beams of hot gas shoot into space at more than 99 percent the speed of light. The plasma emits X-rays, radio waves and other radiation, all of which has been widely observed.

Researchers assume the

LIVERPOOL

SCIENCE TUESDAY

Visit SPACE.com to explore a new Science feature each Tuesday.

>> Go to Science Tuesday Archive page

Images

SPACE Community

Become a Space.com Member

Log In Join Now!

Discussion Board

e-Newsletter Sign

http://www.space.com/scienceastronomy/blackhole_jets_040817.html

27/05/31

Annex 55a

material is accelerated by some mechanism related to the black hole. But there are multiple theories.

One idea is that the spinning of the black hole drags space and time, which twists magnetic field lines and generates a coiled force akin to what allows Tigger to bounce on his tail. Researchers led by Vladimir Semenov of the State University in St. Petersburg, Russia, have created a new computer model that supports this notion.

Semenov's colleague, Brian Punsly of Boeing Space and Intelligence Systems, explained what the team thinks is going on.

Plasma, a superheated gas considered the fourth state of matter, infuses the inner part of a galaxy. Some of it spins into a fairly flat disk around the equatorial region of the central black hole as it gets sucked inward.

"The plasma takes weak strands of magnetic field along for the ride, depositing them near the black hole," Punsly said in an e-mail interview.

This accumulation of magnetized plasma creates a strong magnetic field near the black hole. The lines are outward like rigid strings that can be envisioned as the skeletal remains of giant space pumpkin. Plasma tends to stick to field lines, effectively forming strings of plasma.

"Plasma sticks to them for the same reason that iron filings trace out a magnetic line of force around a magnet," Punsly said in an e-mail interview. At the heart of the galaxy, all this gets very interesting. "The strings wind around the black hole."

But this is no simple winding action. The black hole is spinning very fast, and according to Einstein it drags space-time with it. Very close to the black hole, the magnetic field is dragged, "twisting up the strings like a corkscrew," Punsly said. Then it all comes rather undone as the contorted setup propagates out along the black hole's rotational axis, taking the plasma with it.



CLICK TO VIEW

An artist's impression of a jet of high-energy particles shot out of the polar region of a supermassive black hole that anchors a distant galaxy. Inset shows Chandra X-ray Observatory observations of a jet emerging from the scene (from a study unrelated to the newly presented computer model). Credit: CXC/M.Weiss



CLICK TO VIEW

A highly technical summary of what's behind the jets, according to the new computer model: A black hole-driven jet is produced on the magnetic flux tubes that experience the torsional stress induced by the opposition of the gravitational frame-dragging force with the J x B electromagnetic force, in which J is the current and B is the magnetic field. Image © Science

Related SPACE.com Stories

- New Twists on the Milky Way's Big Black Hole
- The True Shape of Black Holes
- Voyage into the Vortex: Survival Tips for Black Hole Travelers
- New Spin on Black Holes: Like Stars, They Rotate

Today's Discussion

What do you think of this story?

Annex 55b

You *can* try this at home.

Take a long flexible wire and imagine it is the magnetic string. Try to make a Slinky by twisting one end relative to the other -- that's the space-time dragging force.

"If you try to do this, the wire won't conform to the Slinky's shape," Punsly predicts. "It will try to spring apart. It is a torsional spring. You will feel two forces, one the uncoiling and a second is an expansion force along the axis of the helix that results from trying to compress the individual coils together. If you release your hands it will spring apart axially."

Roger Blandford, a California Institute of Technology professor who has been theorizing about black hole jets since the 1970s, said the idea that a rotating black hole directly drags the magnetic field, thus accelerating the plasma, is probably the current leading theory for how the jets are produced. "However, the specifics are controversial," he said.

And Blandford and others say there are at least two other processes that could be at work.

The orbiting disk of material coming into the black hole might drag the magnetic field, launching jets from the accretion disk, not from near the hole, explained David Meier, an astrophysicist at NASA's Jet Propulsion Laboratory who has also modeled black hole jet formation on computers. Or perhaps the black hole drags the disk around, which drags the field around, and thereby indirectly accelerates the jet.

"The field is still very much up in the air," Meier told *SPACE.com*.

The problem, of course, is that black holes can't be seen. Even the environments around black holes, being so chaotic and full of energy and bright plasma, thwart close scrutiny. The key to figuring all this out, Meier said, would be to measure black hole spin rates -- something that astronomers don't yet know how to do.

"If we could determine -- as we suspect -- that black holes with powerful jets are spinning rapidly while those without strong jets are not, then we would at least understand that it is the black hole rotation that creates the jets," Meier said.

- The New History of Black Holes
- More Black Hole News



The Space Top 10s



Vote for your Space Favorites



Space Trivia



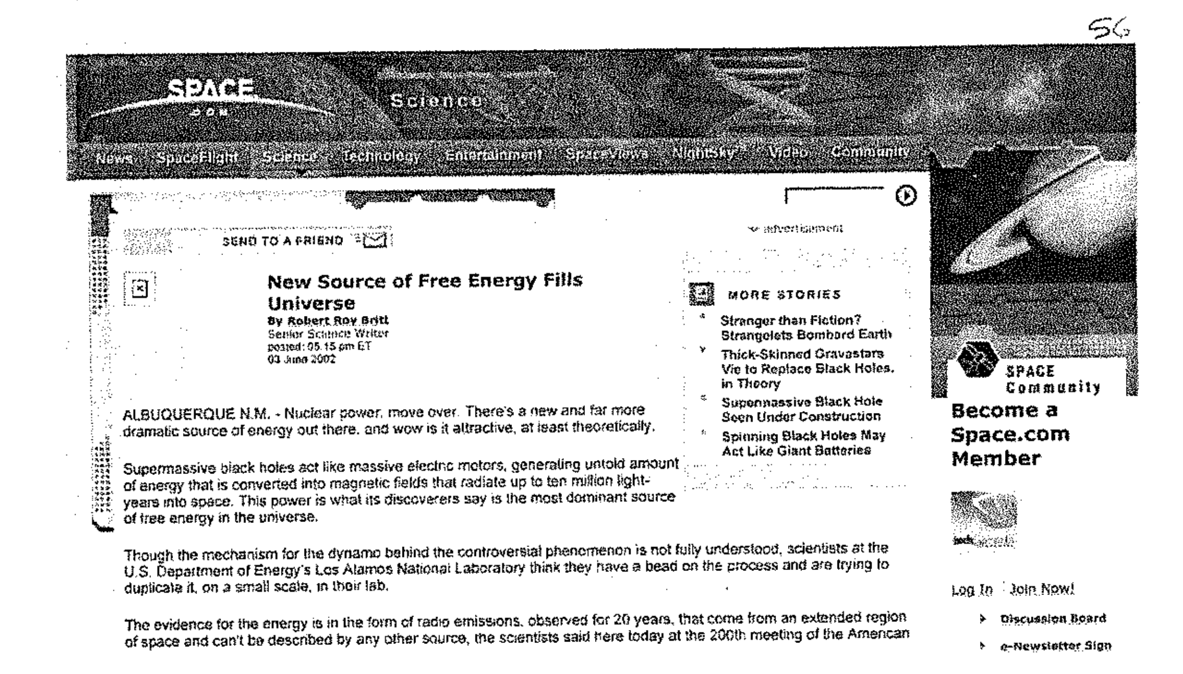
Multimedia Features



SPACE.com Reader Favorites

Space Wallpapers

Annex 56



New Source of Free Energy Fills Universe

By Robert Roy Britt
Senior Science Writer
posted: 05:15 pm ET
03 June 2002

ALBUQUERQUE N.M. - Nuclear power, move over. There's a new and far more dramatic source of energy out there, and wow is it attractive, at least theoretically.

Supermassive black holes act like massive electric motors, generating untold amount of energy that is converted into magnetic fields that radiate up to ten million light-years into space. This power is what its discoverers say is the most dominant source of free energy in the universe.

Though the mechanism for the dynamo behind the controversial phenomenon is not fully understood, scientists at the U.S. Department of Energy's Los Alamos National Laboratory think they have a bead on the process and are trying to duplicate it, on a small scale, in their lab.

The evidence for the energy is in the form of radio emissions, observed for 20 years, that come from an extended region of space and can't be described by any other source, the scientists said here today at the 200th meeting of the American

Annex 56a

Astronomical Society. While they admit their model is speculative, they say no one has yet come up with anything better.

Here's how they think it works: In the ancient universe, large young galaxies were dominated by highly energetic supermassive black holes at their centers. Each could contain the mass of 100 million stars. A flat disk of material, mostly gas, developed around the black hole, spiraling inward. Researchers believe these disks became magnetically charged.

Los Alamos scientist Stirling Colgate offered an analogy for how the magnetic energy is wrapped around the black hole, and how the more there is, the more potential it creates.

"It's just like when you wrap a rubber band around your thumb," Colgate said. "The first wrap doesn't stop the circulation and hurt your thumb," Colgate explained. "The tenth wrap ... you're in a bad state."

Now also imagine that your thumb is spinning, winding the system tighter and tighter. Meanwhile, billions of other stars orbit around the center of the galaxy, and those nearest the center, where it is most crowded, get accelerated to high velocities. Think of it as a swarm of bees, explained Colgate's colleague Philipp Kronberg. Frequently, they pierce and stretch the rubber bands.

"Along comes a star the size of the Sun and collides with the disk," Colgate continued, "and makes a massive collision." Some of the magnetic lines are pulled up out of the disk. "The magic is, it rotates them."

Having magnetic fields at 90 degrees to the main disk creates a dynamo, Colgate said. The twisted field continues to rotate with the primary accretion disk, but now it casts magnetic energy into space.

The idea has been simmering for years. However, now the researchers have the radio emissions that support the notion. Kronberg said there's no disputing the tremendous energy they've measured; and it had to come from a black hole's accretion disk, he said, for nothing else in that part of space is powerful enough to have created it.

Kronberg also said the implications of the work could change theories about how galaxies form, but more research is needed to figure out how.

"This is an emerging, controversial interpretation of our universe," Colgate said. "There is a slowly growing awareness of this dominant, new, implied free energy in the universe."

Don't assume it's true, he added. "It's just the best we can come up with."

In an interview, Colgate explained that free energy is energy that has been converted into a useable form, such as magnetism, that could, if harnessed, run a machine. Though the free energy from black holes is not likely to ever be tapped by humans, it does represent a significant and largely unexplored aspect to the universe.

Annex 56b

56

Colgate said free energy is not something that would explain exotic dark matter or dark energy, two phenomena that other theorists have described but not yet detected.

The Los Alamos research team includes Hui Li, Quentin Dufton, Vladimir Pariev and John Finn. While the free energy of space would not likely be tappable for any commercial source, the researchers are building a laboratory model in order to better understand the process.

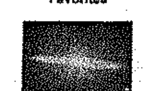

The Space Top 10s


Vote for your Space Favorites

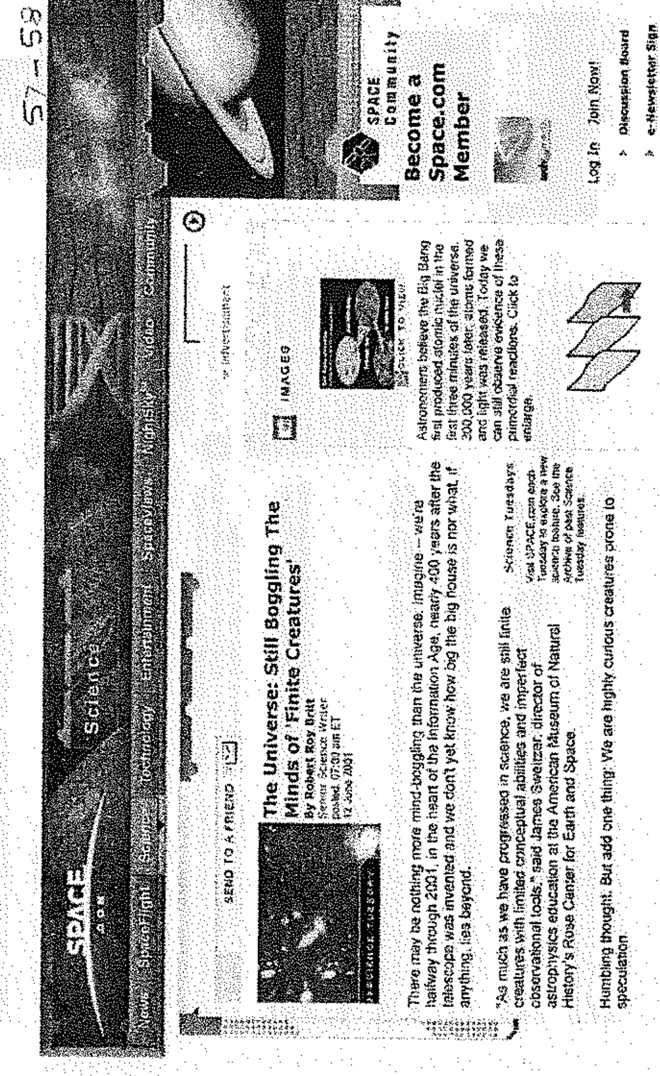

Space Trivia


Multimedia Features


SPACE.com Reader Favorites


Space Wallpapers

Annex 57-58



SPACE.com — The Universe: Still Boggling The Minds of 'Finite Creatures'

Page 1 of 7

57 – 58

SPACE.com

Science

News | SpaceFlight | Science | Technology | Entertainment | SpaceViews | NightSky | Video | Community

SEND TO A FRIEND

The Universe: Still Boggling The Minds of 'Finite Creatures'

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
12 June 2001

There may be nothing more mind-boggling than the universe. Imagine — we're halfway through 2001, in the heart of the Information Age, nearly 400 years after the telescope was invented and we don't yet know how big the big house is nor what, if anything, lies beyond.

"As much as we have progressed in science, we are still finite creatures with limited conceptual abilities and imperfect observational tools," said James Sweitzer, director of astrophysics education at the American Museum of Natural History's Rose Center for Earth and Space.

Science Tuesdays
Visit SPACE.com each Tuesday to explore a new science feature. See the Archive of past Science Tuesday features.

Humbling thought. But add one thing: We are highly curious creatures prone to speculation.

advertisement

IMAGES

CLICK TO VIEW

Astronomers believe the Big Bang first produced atomic nuclei in the first three minutes of the universe. 300,000 years later, atoms formed and light was released. Today we can still observe evidence of these primordial reactions. Click to enlarge.

SPACE Community

Become a Space.com Member

Log In   Join Now!

- Discussion Board
- e-Newsletter Sign

http://www.space.com/scienceastronomy/astronomy/universe_overview_010605-1.html

27/05/31

Annex 57-58a

57 – 58

That in mind, we wanted to at least pose the questions that we suspect swirl through the minds of all who have ever been curious, who have ever looked up on a dark night and simply wondered.

How old is the universe? Does it have an edge? And, c'mon, truthfully -- How could it all have begun in some "Big Bang" that originated in a spot smaller than the dots under all these questions marks?

For answers, we pestered Sweitzer and Mario Livio, head of the science division at the Space Telescope Science Institute in Baltimore.

What a cosmic can of worms. Turns out even the word "universe" is elusive, having three meanings (two of which depend on whether or not you hit the shift key). So we start with the basics.

What does the word "universe" mean?

The "observable universe," Sweitzer explained, "is the one astrophysicists generally talk about because it's the one open to empirical measurements. In fact it's the only one we can or ever will be able to talk with any certainty about."

He goes on to explain that "universe" (sans the word "observable") is a larger concept that scientists think "conforms to our laws of physics and all the assumptions that go with them." Comprehending this universe, Sweitzer said, "requires a leap of faith into unobservable realms."

Finally, there is "the Universe," which, by virtue of its capital "U," includes "absolutely everything, even possibilities of dimensions, modes and regions that obey laws of physics we don't know or maybe even can't know."

Okay then. If we can't know it, let's move on to the next question.

How did the universe begin?

There is a very simple answer to this question: We don't know. And we may never know.

The leading theory for the formation of our universe is the Big Bang, of course. According to this theory, all the matter and energy in our present observable universe was compressed into a very small area, before, in a nanosecond, it exploded outward and expanded continually until the present time -- and will perhaps do so forever.

CLICK TO VIEW

ANIMATION: See how branes would exist in a fifth dimension and create an Ekpyrotic Universe.





CLICK TO VIEW

THEORY: Computer model of the early universe. Gravity arranges matter in thin filaments. High-density regions (yellow) undergo collapse and ignite bursts of star formation. These proto-galaxies stream along the filaments (red shows medium density) and meet at nodes, causing a buildup of galaxies. Low-density areas are blue.

MORE STORIES

- Our Tangled Universe: How the First Galaxies Were Born
- 'Brane-Storm' Challenges Part of Big Bang Theory
- 'Milestone' Study Challenges Basic Laws of Physics, Universe
- Readers' Choice: The Weirdest Thing in Space is ...

Annex 57-58b

57–58

Unimaginable as it might seem, the Big Bang theory is tame compared to some recently emerging wilder ideas, speculations that pop up like parallel universes in a vacuum of understanding.

Some cosmologists say our observable universe is one of many that spring forth continually from a series of bubbles. In this scenario, one Big Bang begets another.

Another recently proposed scenario holds that instead of springing forth in a violent instant from a teensy point in space, our universe was created when two parallel membranes collided. These "branes," as theorists call them, would have floated like sheets of paper through a fifth dimension until slamming together and generating energy and heat that led to the same expansion described by traditional Big Bang theory.

This Ekpyrotic Universe theory, as it is called, does not replace Big Bang theory. Instead, it offers an alternative way that the currently observed expansion might have been jump-started.

In any case, the Big Bang theory does not actually explain how the universe began. It assumes that space, time and energy already existed. Accept that rather significant caveat and one can then discuss the leading theory for how our present observable universe came into being.

"It started from an extraordinarily dense and hot state, and it has been expanding ever since," said Livio, of the Space Telescope Science Institute, giving perhaps the world's most concise definition of the Big Bang model. But there's more to point out here, including the fact that "dense" is rather an understatement.

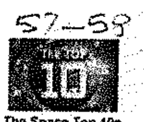
Everything that exists now, at least in the observable universe, was once all packed into a sphere one millionth of a meter across, Sweitzer said. Translation -- too small to see.

"That may seem pretty small, but it's only because of our human perspective," Sweitzer assured us, adding that today's universe is "extraordinarily empty." Imagine, as an example, that the area of our solar system -- with nine planets packed into a region less than 9 billion miles (14.5 billion kilometers) across -- is relatively crowded compared to the vast empty stretches between stars, where nothing but a few molecules hang out.

"So there's lots of room to compact what we already see," Sweitzer said. But there was a trade-off for all this miniaturization, like a car that's cheap to run but cramped to sit in. In the case of the universe, it was heat.

"Mighty hot," as Sweitzer put it. As in 10 degrees with 32 zeros after it.

Over time, the universe expanded, cooling as it did so. This expansion was discovered in the 1920s, when Edwin Hubble found that every galaxy he looked at, in any direction, was racing away from us. In fact, the Big Bang was initially suggested to explain this expansion.


The Space Top 10s


Vote for your Space Favorites


Space Trivia


Multimedia Features

SPACE.com Reader Favorites


Space Wallpapers

Annex 57-58c

57–58



Space Video Collection

Space Image Gallery Collection

Early on, things were smooth. Real smooth.

But the expansion had a ripple effect of major importance, triggering lumps and bumps in the otherwise uniform fabric of space, which led to the birth of the first galaxies.

The Big Bang theory long ago predicted that an aftereffect of these ripples should exist today, throughout the universe, in a faint glow of radiation called cosmic microwave background radiation. This was confirmed in 1964.

Next Page: How old is the observable universe? Is it finite or infinite? And does it have an edge?

1 2 | >> Continue with this story >

Annex 59

SPACE.com Science

News | SpaceFlight | Science | Technology | Entertainment | SpaceViews | NightSky | Video | Community

SEND TO A FRIEND

The Universe: Still Boggling The Minds of 'Finite Creatures'

By Robert Roy Britt
Senior Science Writer
posted: 07:00 am ET
12 June 2001

IMAGES

Astronomers believe the Big Bang first produced atomic nuclei in the first three minutes of the universe. 300,000 years later, atoms formed and light was released. Today we can still observe evidence of these primordial reactions. Click to enlarge.

SPACE Community

Become a Space.com Member

Log In Join Now!

- Discussion Board
- e-Newsletter Sign

How old is the observable universe?

While some of the smartest scientists in the world have been working for decades to pin down an age for the universe, it's still an elusive number and subject to hearty disagreement. The most commonly cited estimates are between 12 billion and 15 billion years.

Estimates come by finding distant sources of light (a star or galaxy 10 billion light-years away is 10 billion years old). But the estimates also depend on the rate at which the observable universe is expanding, which in turn is related to its exact composition and evolution.

And evidence presented in the past couple of years tells us the pace of expansion is

Annex 59a

actually accelerating. This unexpected discovery has only served to further confuse things, because no one can figure out what is causing this acceleration.

Researchers speculate that it might be the result of some strange and unknown matter or energy whose force of gravity repels, rather than attracts, over long distances.

All the confusion aside, Sweitzer, like any good scientist, has his own estimate of the age of the universe: "It's about 13 billion light-years from where we are to [the observable universe's] isotropic boundary, which is seen as the cosmic microwave background radiation."

As researchers push telescopic power to new limits, they have begun to see objects back to when the universe was just 2 billion years old or so. But they will likely never see the beginning.

"When we look in electromagnetic radiation (like light) we can only see the universe to the time when it was about 300,000 years old, because the universe was opaque to such radiation before that," Livio said.

So the universe is expanding, and it's been doing so for billions of years. And we can't see the beginning of it. All of which begs the next question.

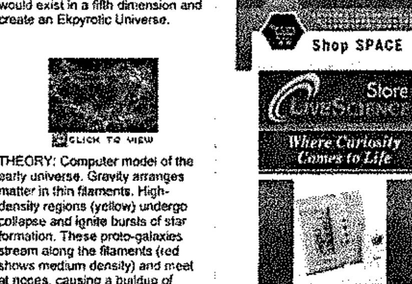
Is the universe finite or infinite?

"The observable universe is finite," Sweitzer said, which is to say that it had boundaries -- physical limits. Sort of. "It's a boundary to the events we can see directly, but not a boundary in the sense that New York State has a boundary."

And in an expanding universe, this boundary is constantly moving, as is everything within it. Cosmologists typically invoke a balloon with spots on its surface, representing galaxies, to explain the expanding universe. As the balloon is inflated, the spots grow farther apart. If you stood within one of these spots, you'd see all the others moving away from you, and the most distant spots would move appear to move the fastest.

CLICK TO VIEW

ANIMATION: See how branes would exist in a fifth dimension and create an Ekpyrotic Universe.



CLICK TO VIEW

THEORY: Computer model of the early universe. Gravity arranges matter in thin filaments. High-density regions (yellow) undergo collapse and ignite bursts of star formation. These proto-galaxies stream along the filaments (red shows medium density) and meet at nodes, causing a buildup of galaxies. Low-density areas are blue.

MORE STORIES

- Our Tangled Universe: How the First Galaxies Were Born
- 'Brane-Storm' Challenges Part of Big Bang Theory
- 'Milestone' Study Challenges Basic Laws of Physics, Universe
- Readers' Choice: The Weirdest Thing in Space Is ...

Sweitzer goes on to say that the observable universe is probably part of a much larger universe, "which could be finite or infinite. Any global statements about the universe, such as overall extent, are speculative because they require extrapolating local mathematical theories and measurements beyond the observable universe."

Annex 59b

59

So if the observable universe is finite, like the space occupied by a car or a house is finite, then there must be a brick wall or something up there, holding it all together. Right?

Does the observable universe have an edge?

No, said Livio.

Argh. First you guys tell us the universe is expanding. Then you say it is finite. Now you say it has no edge! We need a visual here.

Livio is up to the task. He dredges up the old expanding balloon as his prop. "An ant traveling on the surface of a balloon will never reach an edge," Livio explains. "In the worst case it will return to its starting point."

And so too do we return. It is now a few moments later in the same year, 2001, heart of the same Information Age, well after the telescope was invented, and we *still* don't know how big the big house is nor what, *if* anything, lies beyond.

But now, perhaps we understand what we don't know a little better.

Click here for the Science Tuesday archives and for more news and information about cosmology. And return each week for another in-depth look at the world of space science.

1 2



The Space Top 10s


Vote for your Space Favorites


Space Trivia


Multimedia Features


SPACE.com Reader Favorites


Space Wallpapers

NASA's miraculous breakthrough in the secrets of cosmology has rendered me the topic of this book. NASA has unwittingly penetrated the veil of secrets which were already propagated by the prophets and the men of God with utmost zeal and enthusiasm. The analogy of DARK ENERGY to the SOUL and DARK MATTER to LAYERS OF SOUL is explained in this book in meticulous detail.

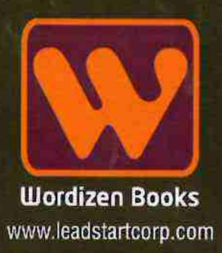
Today, ultimately modern science and the religions have met and come together to ignite the torch of a new era of human civilization in which scientific research will focus on the realms of unknowns like DARK MATTER and DARK ENERGY, a topic so vast and so new that will be of high interest to the religions, who pursue the spiritual matters of SOUL and LAYERS OF SOUL in human beings, and which I have proved in this book to be same like DARK ENERGY and DARK MATTER – same truths but in different names.

DARK ENERGY and DARK MATTER are ubiquitous and have their manifestations in humans also and at the same proportions like in the universe. Now, they are proved by me that they are there, but are called differently as SOUL and LAYERS OF SOUL.

Religious introspection reveals these forces at action in the human beings, although they are unknown and can't be seen. It is proved now beyond doubt that the absolute truths lay in these unknown invisible realms, which can't be seen neither felt by our humanly tools and instruments.

In religion, self-cognition and introspection can reveal them, whereas in science it will be a hot topic for future scientific researches, scrutiny and investigations.

I wish all the best for this blessed union in which Science and Religion both together will join hands to build a new civilization in which absolute truths will be pursued. We will bid farewell to relative truths and focus this time on absolute truths.



Wordizen Books
www.leadstartcorp.com

Non-Fiction



978-93-81836-26-2
9 789381 836262
₹395 $20